IEI Technology Corp.

MODEL:

PICOe-GM45A

Half-size PCIe CPU Card Supports Intel® Core™ 2 Duo CPU, VGA/LVDS/HDTV-out, Dual GbE, USB 2.0 and Four SATA II

User Manual

Rev. 1.00 25 November, 2008

RoHS Lead Free

Revision

Date	Version	Changes
25 November, 2008	1.00	Initial release

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Manual Conventions

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text. The text is the warning message. A warning message is shown below:

WARNING:

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the PICOe-GM45A or personal injury to the user. Please take warning messages seriously.

CAUTION!

Cautionary messages should also be heeded to help reduce the chance of losing data or damaging the PICOe-GM45A. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed. The italicized text is the cautionary message. A caution message is shown below:

CAUTION:

This is an example of a caution message. Failure to adhere to cautions messages may result in permanent damage to the PICOe-GM45A. Please take caution messages seriously.

NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text. The text is the cautionary message. A note message is shown below:

NOTE:

This is an example of a note message. Notes should always be read. Notes contain critical information about the PICOe-GM45A. Please take note messages seriously.

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the PICOe-GM45A from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The items listed below should all be included in the PICOe-GM45A package.

- 1 x PICOe-GM45A Single Board Computer
- 1 x Mini Jumper Pack
- 2 x SATA cable
- 1 x SATA power cable
- 1 x Keyboard/Mouse Y cable
- 1 x Dual RS-232 cable
- 1 x USB cable
- 1 x Utility CD
- 1 x QIG

Images of the above items are shown in **Chapter 3**.

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Chapter

1

Introduction

1.1 Overview

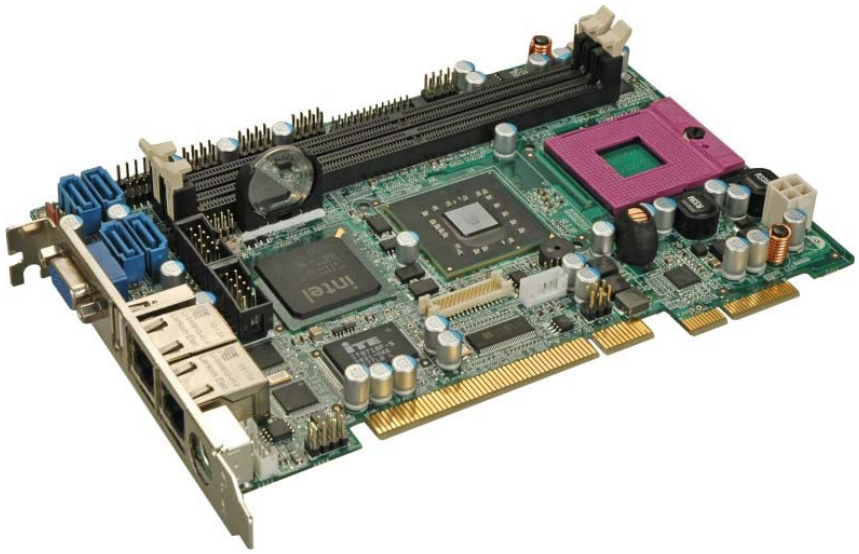


Figure 1-1: PICOe-GM45A

1.1.1 PICOe-GM45A Introduction

The PICOe-GM45A half-size PCIe CPU card is a Socket P Intel® Core™2 Duo and Intel® Celeron® M processor platform. Both 45nm core (Penryn) and 65nm core (Merom – Santa Rosa) processors are supported.

Up to two 2.0 GB 667 MHz or 800 MHz un-buffered DDR2 SDRAM DIMM are supported by the Intel® GM45 graphics memory controller hub (GMCH). The Intel® GM45 GMCH also supports 18-bit or 24-bit dual-channel LVDS, analog CRT and HDTV output.

The integrated Intel® ICH9M I/O controller hub (ICH) supports four SATA II drives with data transfer speeds of 3.0 Gbps. Seven USB 2.0 channels, four expansion PCIe x1 channels and four expansion PCI channels provide flexible expansion options. High Definition Audio (HDA) support ensures an HDA audio kit can be easily implemented on the PICOe-GM45A.

1.2 PICOe-GM45A Overview

1.2.1 PICOe-GM45A Overview Photo

The PICOe-GM45A has a wide variety of peripheral interface connectors. **Figure 1-2** is a labeled photo of the peripheral interface connectors on the PICOe-GM45A.

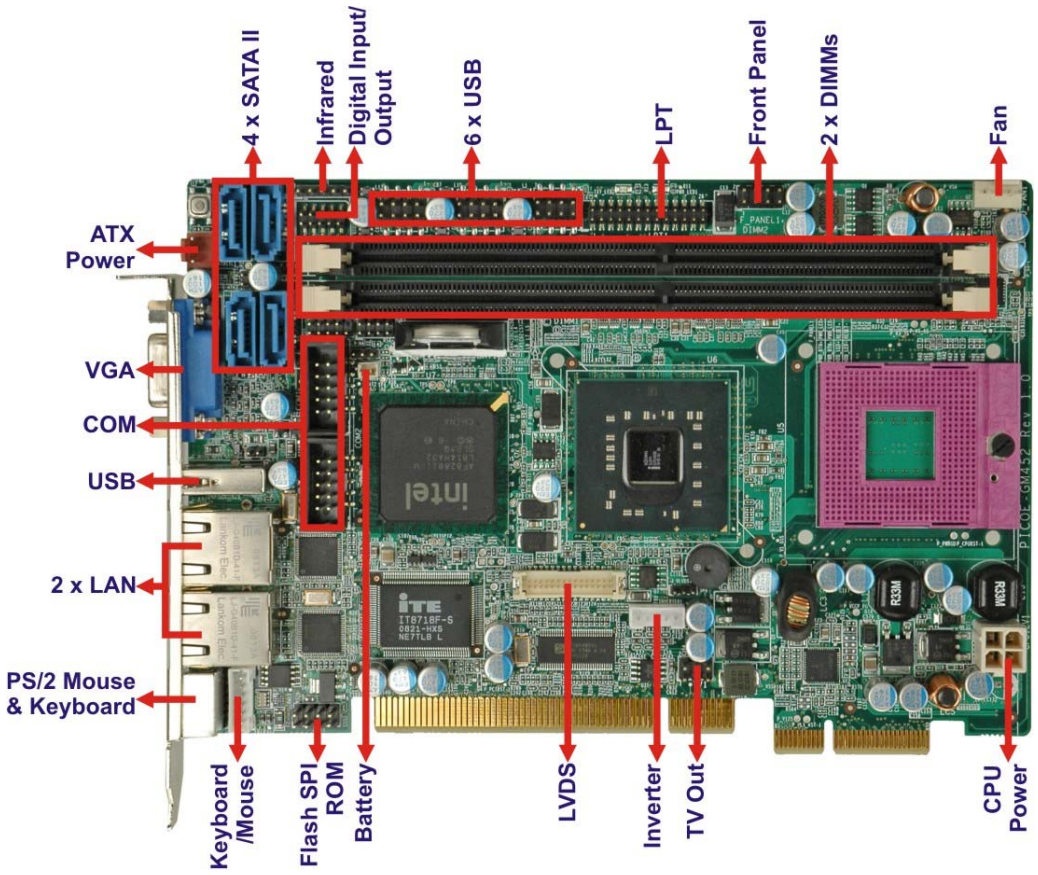


Figure 1-2: PICOe-GM45A Overview [Front View]

Figure 1-3 shows the rear side of the PICOe-GM45A.

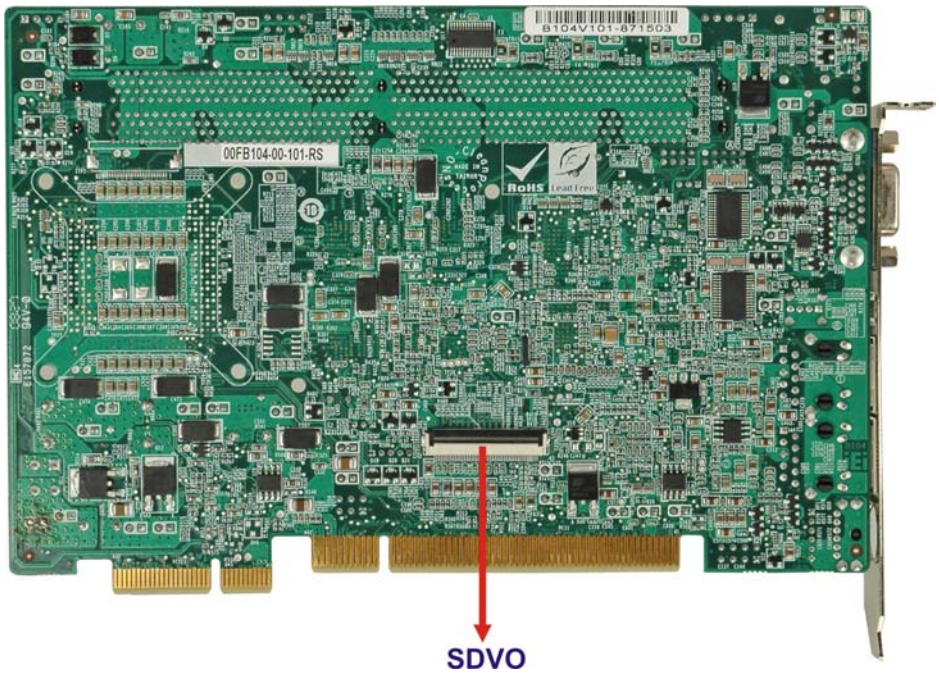


Figure 1-3: PICOe-GM45A Overview [Solder Side]

1.2.2 PICOe-GM45A Peripheral Connectors and Jumpers

The PICOe-GM45A has the following connectors on-board:

- 1 x ATX power supply enable connector
- 1 x Audio connector
- 1 x Backlight inverter connector
- 1 x CPU power connector
- 1 x Digital input/output (DIO) connector
- 2 x DDR2 DIMM sockets
- 1 x Fan connector
- 1 x Front panel connector
- 1 x Infrared interface (IrDA) connector
- 1 x Keyboard connector
- 1 x LVDS connector
- 1 x Parallel port connector
- 4 x Serial ATA (SATA) drive connectors
- 1 x SDVO connector
- 2 x RS-232 serial port connectors

- 1 x SPI Flash connector
- 1 x TV Out connector
- 3 x USB 2.0 connectors (supports six USB 2.0 devices)

The PICOe-GM45A has the following external peripheral interface connectors on the board rear panel.

- 2 x Ethernet connectors
- 1 x PS/2 connector
- 1 x USB connector
- 1 x VGA connector

The PICOe-GM45A has the following on-board jumpers:

- AT power selection
- Clear CMOS
- LVDS voltage selection
- LVDS panel resolution selection
- PCIe interface setup

1.2.3 Technical Specifications

PICOe-GM45A technical specifications are listed in **Table 1-1**. See **Chapter 2** for details.

Specification	PICOe-GM45A
System CPU	45 nm Socket P Intel® Core™2 Duo processor or Intel® Celeron® M processor
Front Side Bus (FSB)	1066 MHz (Max.), 800 MHz or 533 MHz
System Chipset	Northbridge: Intel® GM45 Southbridge: Intel® ICH9M
Memory	Two 240-pin DIMM sockets support two 667/800 MHz 2.0 GB (max.) DDR2 SDRAM DIMM (system max. 4 GB)
Super I/O	ITE IT8718F

Display	VGA integrated in Intel® GM45 18-bit or 24-bit dual-channel LVDS integrated in Intel® GM45 HDTV with 1080i maximum resolution supported SDVO interface supported
BIOS	AMI BIOS label
Audio	7.1 channel HD audio kit with Realtek ALC883 codec supports dual audio streams
LAN	Two Intel® 82574L PCIe GbE controllers
COM	Two RS-232 serial ports
USB2.0	Seven USB 2.0 devices supported: ■ Six by onboard pin-headers ■ One by external connector
SATA	Four 3.0 Gbps SATA II drives supported
Keyboard/mouse	One external PS/2 connector One 6-pin header
Parallel Port	One 26-pin parallel port connector
Digital I/O	One 8-bit digital input/output connector; 4-bit input/4-bit output through the ITE IT8718F super I/O
Watchdog Timer	Software programmable 1-255 sec. through the ITE super I/O
Infrared	One infrared connector through the ITE super I/O. Supports: ■ Serial Infrared (SIR) ■ Amplitude Shift Keyed IR (ASKIR)
Power Supply	ATX and AT power supported
Power Consumption	5V @ 10.21A, 12V@0.11A (2.2 GHz Intel® Core™2 Duo T7500 CPU with a 800 MHz FSB and two 2 GB 800 MHz DDR2 DIMMs, 3D Mark 2001SE)

Temperature	0ºC – 60ºC (32ºF - 140ºF)
Humidity (operating)	5%~95% non-condensing
Dimensions (LxW)	185 mm x 122 mm
Weight (GW/NW)	1000g/171g

Table 1-1: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Dimensions

2.1.1 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 185 mm
- **Width**: 122 mm

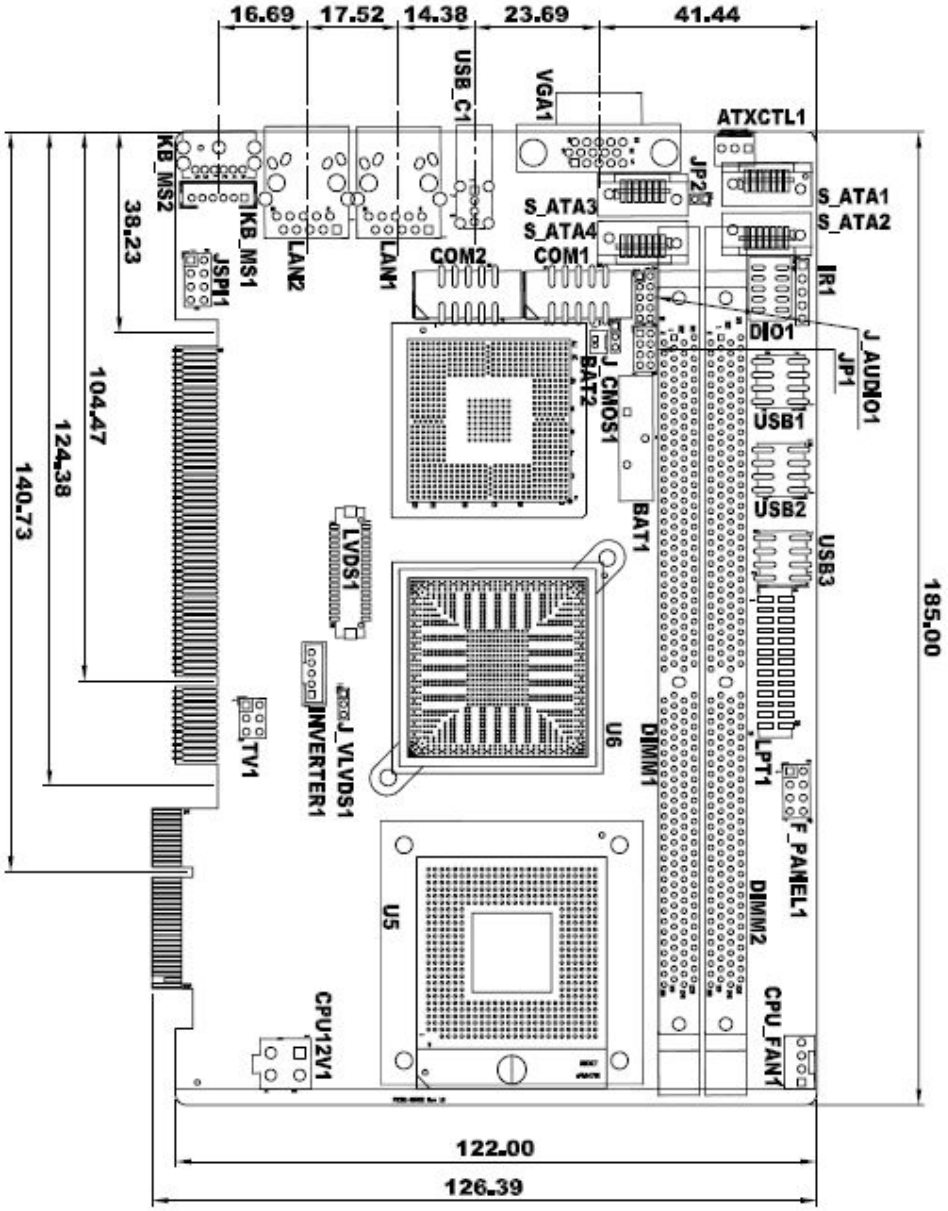


Figure 2-1: PICOe-GM45A Dimensions (mm)

2.1.2 External Interface Panel Dimensions

External peripheral interface connector panel dimensions are shown in **Figure 2-2**.

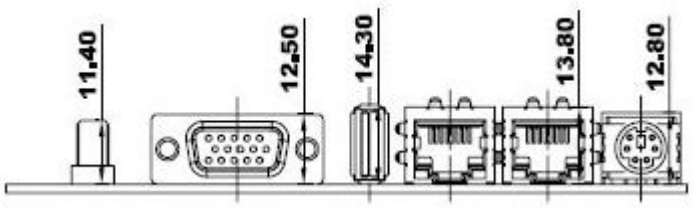


Figure 2-2: External Interface Panel Dimensions (mm)

2.2 Data Flow

Figure 2-3 shows the data flow between the two on-board chipsets and other components installed on the CPU card and described in the following sections of this chapter.

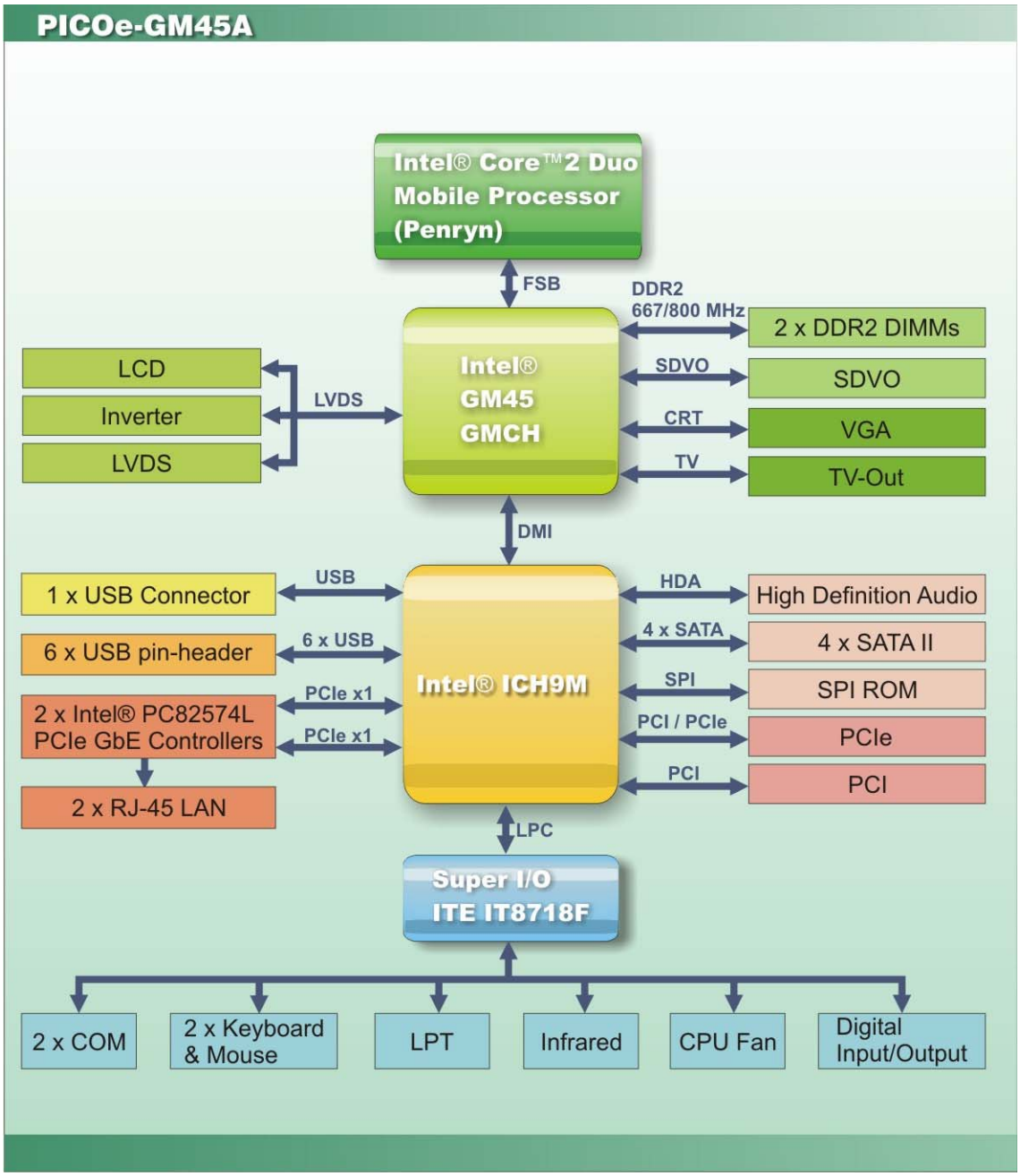


Figure 2-3: Data Flow Block Diagram

2.3 Embedded PICOe-GM45A Processor

2.3.1 Overview

The PICOe-GM45A supports 45 nm Socket P Intel® Core™2 Duo processor (Penryn) or Intel® Celeron® M processor. The processor supports a 667 MHz, 800 MHz or 1066 MHz FSB and has a 6 MB (max.) L2 cache. The processor is shown in **Figure 2-4** below.

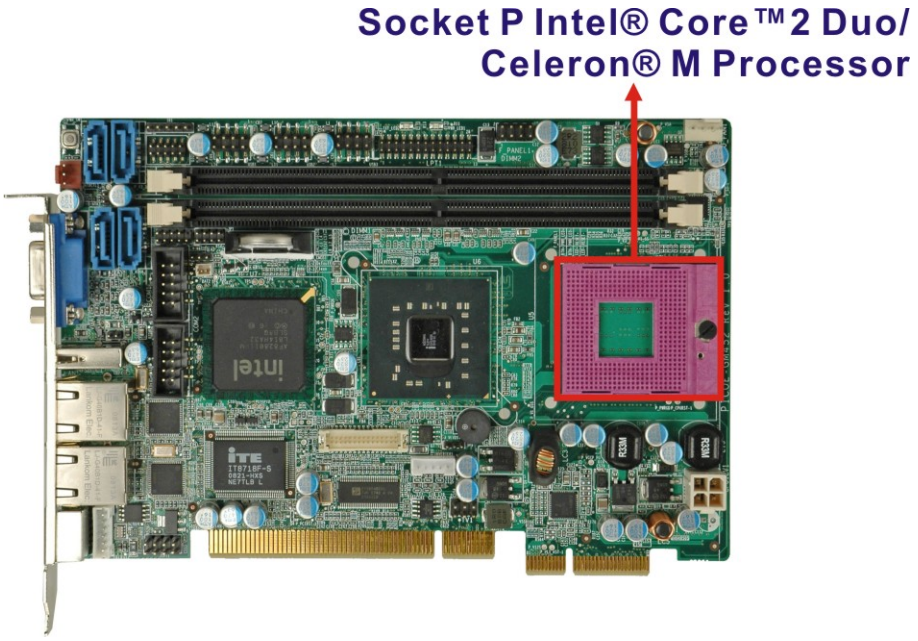


Figure 2-4: Embedded Processor

2.3.2 Features

Some of the features of the Intel® Core™2 Duo processor (Penryn) are listed below

- Intel® Core™ Microarchitecture
- Dual Execution Cores
- Intel® 64 Architecture
- 36-bit FSB Addressing
- Up to 1066 MHz FSB
- Up to 6 MB L2 Cache
- SSE4 instruction set
- Enhanced Intel® Dynamic Acceleration (with hysteresis)

- Intel® Thermal Monitor support with Adaptive Thermal Monitor 2 enhancement
- Manufactured on 45 nm process
- Enhanced Intel SpeedStep® Technology
- Dynamic Front Side Bus Frequency Switching
- Supports Enhanced Intel® Virtualization Technology (VT-d1)
- Intel® Trusted Execution Technology
- Enhanced Multi Threaded Thermal Management (EMTTM)
- Supports PSI2 functionality
- Intel® Deep Power Down State (C6)

2.3.3 Front Side Bus (FSB)

The Intel® Core™2 Duo processor on the PICOe-GM45A is interfaced to the Intel® GM45 through a 533/800/1066 MHz front side bus (FSB). The FSB is shown in **Figure 2-5** below.

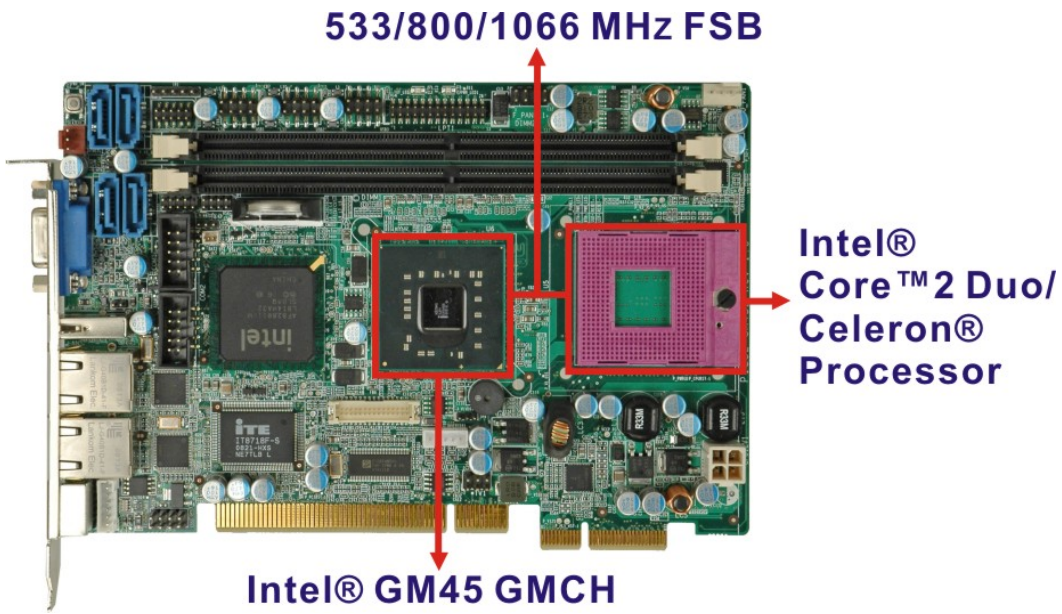


Figure 2-5: Front Side Bus

2.4 Intel GM45 Northbridge Chipset

2.4.1 Intel® GM45 Overview

The Intel® GM45 Graphics and Memory Controller Hub (GMCH) supports the Intel® Core™2 Duo processor (Penryn). The Intel® GM45 is interfaced to the processor through a FSB.

2.4.2 Intel® GM45 DDR2 Controller

WARNING:

Only DDR2 memory module can be installed on the PICOe-GM45A. Do not install DDR memory modules. If a DDR memory module is installed on the PICOe-GM45A, the PICOe-GM45A may be irreparably damaged.

There are two 240-pin DDR2 DIMM sockets on the PICOe-GM45A. The sockets support DDR2 DIMMs with the following specifications:

- Two 240-pin DIMMs
- DDR2 only (**DO NOT** install a DDR DIMM)
- Maximum Memory supported 4 GB (2 GB per rank)
- Support for DDR2 at 667 MHz and 800 MHz
- Single-channel or dual-channel
- 64-bit wide per channel

The DIMM sockets are shown in **Figure 2-6** below.

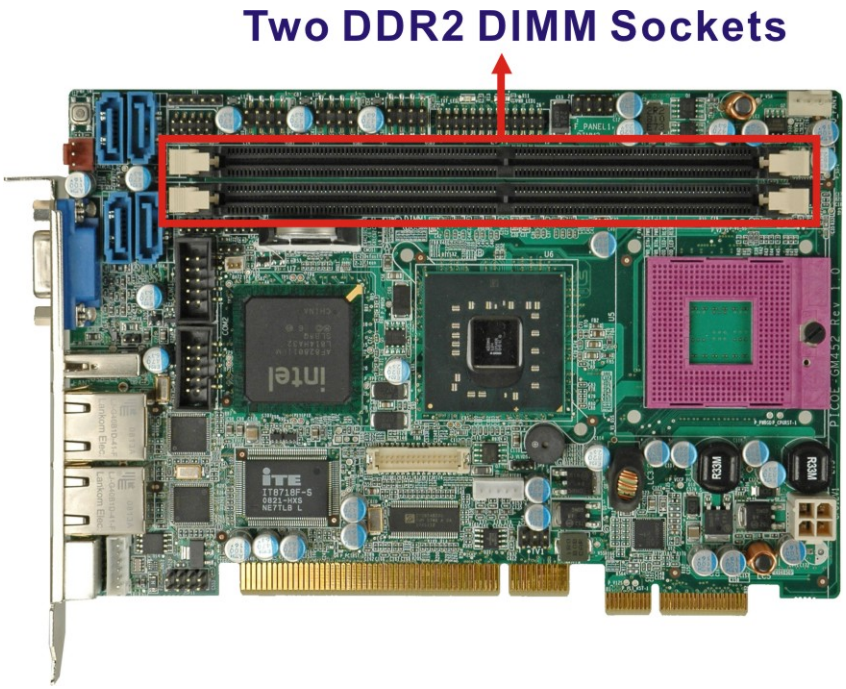


Figure 2-6: DDR2 DIMM Sockets

2.4.3 Intel® GM45 Graphics

The Intel® GM45 supports CRT, LVDS, TV-Out and SDVO. The internal graphics engine has the following features:

- Intel® Gen 5.0 integrated graphics engine
- 533-MHz core render clock at 1.05-V core voltage
- Supports TV-Out, LVDS, CRT and SDVO
- Dynamic Video Memory Technology (DVMT 5.0)
- Video Capture via x1 concurrent PCIe port
- High performance MPEG-2 decoding
- WMV9 (VC-1) and H.264 (AVC) support
- Hardware acceleration for MPEG2 VLD/iDCT
- Hardware motion compensation
- Intermediate Z in classic rendering

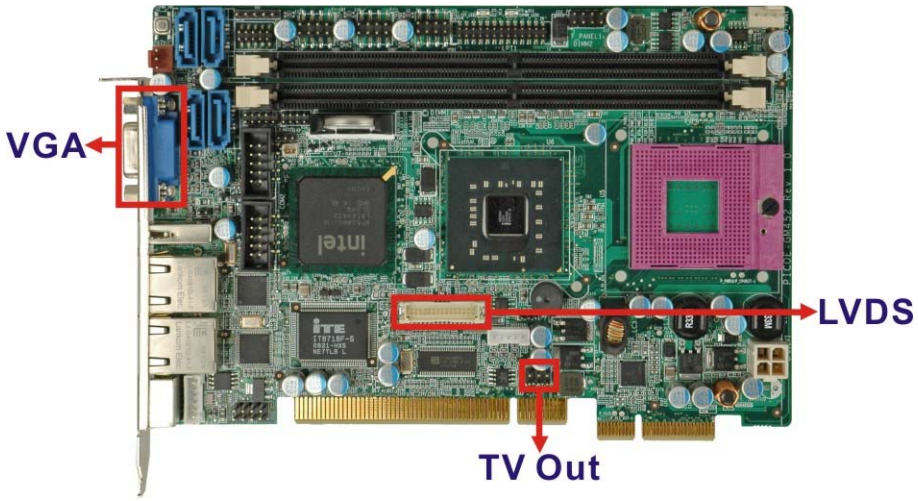


Figure 2-7: PICOe-GM45A Display Connectors

2.4.3.1 Analog CRT Graphics Mode

The analog CRT bus is interfaced to an external DB-15 interface connector. The connector is shown in **Figure 2-7**. Some of the features of the CRT include:

- Integrated 300-MHz RAMDAC
- Analog Monitor Support up to QXGA
- Support for CRT Hot Plug

2.4.3.2 LVDS Interface

The LVDS interface is connected directly to the LVDS connector on the board (**Figure 2-7**). Some of the features of the LVDS interface include:

- 25-MHz to 112-MHz single-/dual-channel; @18 bpp or 24 bpp
  - TFT panel type supported
- Pixel Dithering for 18-bit TFT panel to emulate 24-bpp true color displays
- Panel Fitting. Panning, and Center Mode Supported
- SPWG v3.5 compliant
- Spread spectrum clocking supported
- Panel Power Sequencing support
- Integrated PWM interface for LCD backlight inverter control

2.4.3.3 TV Out Interface

The TV Out interface (**Figure 2-7**) has the following features.

- Overscaling
- NTSC/PAL
- Component, S-Video and Composite Output interfaces
- HDTV graphics mode support

2.4.3.4 Serial Digital Video Output (SDVO)

Some of the features of the SDVO ports are listed below.

- Concurrent operation of PCIe x 1 with SDVO
- Two SDVO ports supported
  - SDVO is muxed onto the PCIe pins
  - DVI 1.0 support for external digital monitor
  - Only Downstream HDCP support
  - Supports TV and DVD formats
  - Display hot plug support

2.5 Intel® ICH9M Southbridge Chipset

2.5.1 Intel® ICH9M Overview

The Intel® ICH9M chipset is connected to the Intel® GM45 GMCH through the chip-to-chip Direct Media Interface (DMI). Some of the features of the Intel® ICH9M are listed below.

- Complies with PCI Express Base Specification, Revision 1.1
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33 MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller
  - Interrupt controller
  - Timer functions

- Integrated SATA host controller with DMA operations interfaced to four SATA connectors on the PICOe-GM45A
- Supports the four USB 2.0 devices on the PICOe-GM45A with four UHCI controllers and one EHCI controller
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Intel® High Definition Audio
- Supports Intel® Matrix Storage Technology
- Supports Intel® Active Management Technology
- Supports Intel® Virtualization Technology
- Contains Low Pin Count (LPC) interface
- Supports Firmware Hub (FWH) interface
- Serial peripheral interface support

2.5.2 Intel® ICH9M High Definition (HD) Audio Controller

Intel® HD Audio controller is interfaced through the Intel® High Definition Audio serial link to the audio connector (**Figure 2-8**) which is in turn connected to an optional 7.1 channel audio kit with an Realtek ALC883 HD audio codec.

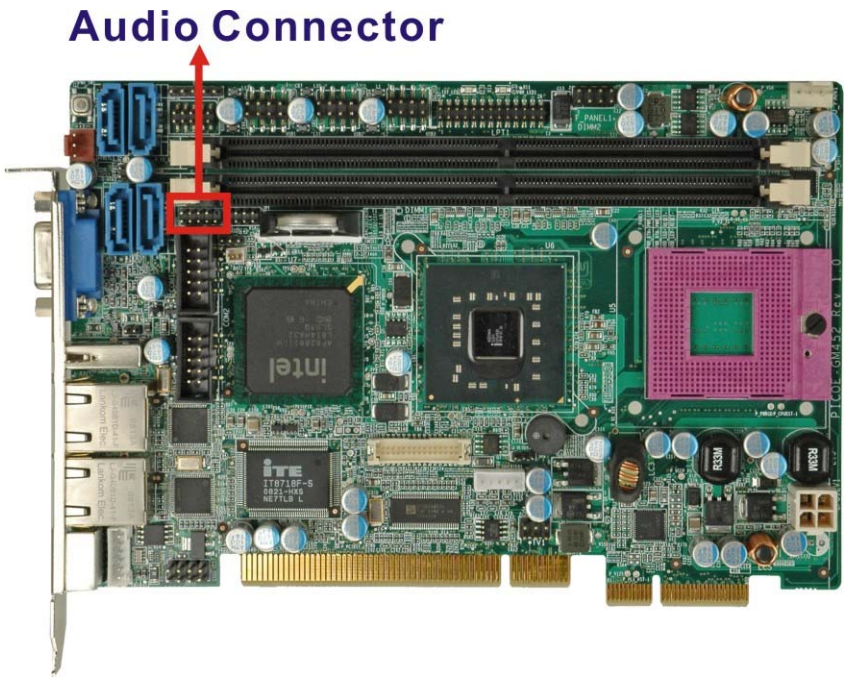


Figure 2-8: Audio Connector

2.5.3 Intel® ICH9M Low Pin Count (LPC) Interface

The ICH9M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH9M is connected to the Super I/O chipset.

2.5.4 Intel® ICH9M PCI Interface

The PCI interface on the ICH9M is compliant with the PCI Revision 2.3 implementation. Some of the features of the PCI interface are listed below.

- PCI Revision 2.3 compliant
- 33 MHz
- 5V tolerant PCI signals (except PME#)
- Integrated PCI arbiter supports up to seven PCI bus masters

The PCI bus is connected to an interface gold finger on the bottom of the CPU card and supports up to four expansion PCI cards on the backplane.

Figure 2-9: PCI Golden Finger

2.5.5 Intel® ICH9M PCIe Bus

The Intel® ICH9M GMCH has six PCIe x1 lanes. All of the PCIe lanes are implemented on the PICOe-GM45A, including:

- Four PCIe x1 expansion cards on a compatible backplane
- Two PCIe x1 lanes are connected to two Intel® 82574L GbE controllers.

For more detailed information, please refer to **Section 2.7**

2.5.6 Intel® ICH9M Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH9M. The RTC operates on a 3V battery and 32.768KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

2.5.7 Intel® ICH9M SATA Controller

The integrated SATA host controllers on the ICH8M-E supports four SATA II drives on the PICOe-GM45A with independent DMA operations. SATA controller specifications are listed below.

- Supports four SATA II drives
- Supports 3 Gbps data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

The SATA connectors are shown in **Figure 2-10**.

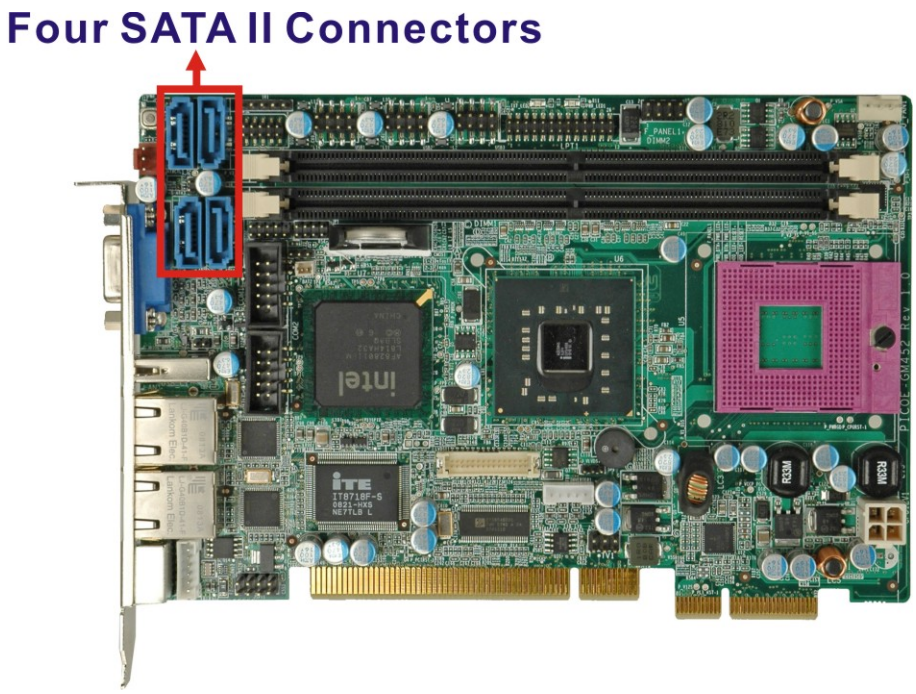


Figure 2-10: SATA II Connectors

2.5.8 Intel® ICH9M Serial Peripheral Interface (SPI) BIOS

The SPI is connected to an SPI BIOS chip. A licensed copy of AMI BIOS is preinstalled on the SPI BIOS chip. A master-slave protocol is used for communication on the SPI bus. The slave is connected to the Intel® ICH9M and is implemented as a tri-state bus.

2.5.9 Intel® ICH9M USB Controller

Up to seven high-speed, full-speed or low-speed USB devices are supported by the ICH9M on the PICOe-GM45A. High-speed USB 2.0, with data transfers of up to 480MB/s, is enabled with the ICH9M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH9M integrated Universal Host Controller Interface (UHCI) controllers.

The seven USB ports implemented on the PICOe-GM45A are connected to three internal connectors and one external connector. See **Figure 2-11**.

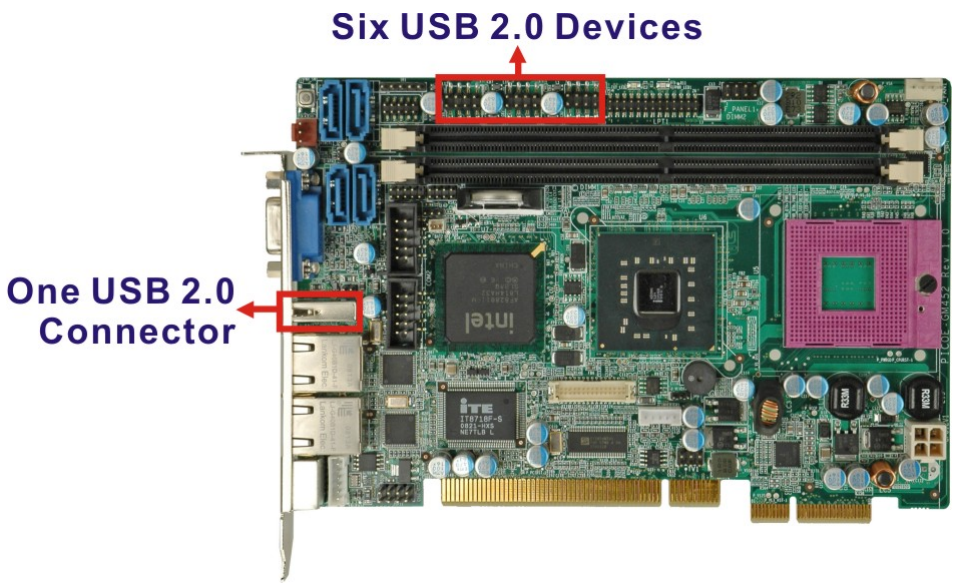


Figure 2-11: Onboard USB Implementation

2.6 LPC Bus Components

2.6.1 iTE IT8718F Super I/O Chipset

The iTE IT8718F Super I/O chipset is connected to the ICH9M through the LPC bus.

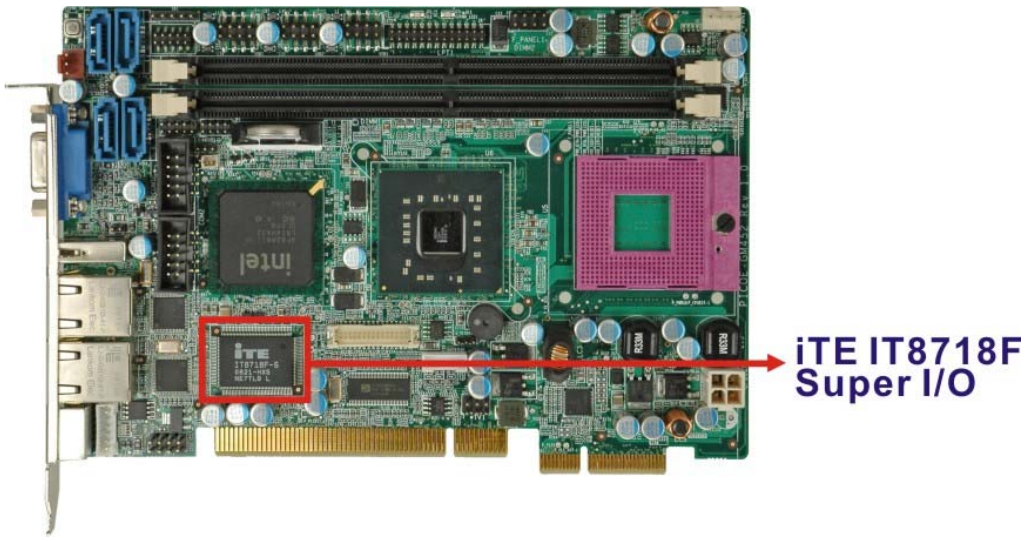


Figure 2-12: Super I/O

The iTE IT8718F is an LPC interface-based Super I/O device that comes with Environment Controller integration. Some of the features of the iTE IT8718F chipset are listed below:

- ACPI and LANDesk Compliant
- Enhanced Hardware Monitor
- Fan Speed Controller
- Two 16C550 UARTs for serial port control
- One IEEE 1284 Parallel Port
- Keyboard Controller
- Watchdog Timer

Some of the Super I/O features are described in more detail below:

2.6.1.1 Super I/O LPC Interface

The LPC interface on the Super I/O complies with the Intel® Low Pin Count Specification Rev. 1.0. The LPC interface supports both LDRQ# and SERIRQ protocols as well as PCI PME# interfaces.

2.6.1.2 Super I/O 16C550 UARTs

The onboard Super I/O has two integrated 16C550 UARTs that can support the following:

- Two standard serial ports (COM1 and COM2)
- IrDa 1.0 and ASKIR protocols

2.6.1.3 Super I/O Digital Input/Output

The input mode supports switch debouncing or programmable external IRQ routing. The output mode supports two sets of programmable LED blinking periods.

2.6.1.4 Super I/O Enhanced Hardware Monitor

The Super I/O Enhanced Hardware Monitor monitors three thermal inputs, VBAT internally, and eight voltage monitor inputs. These hardware parameters are reported in the BIOS and can be read from the BIOS Hardware Health Configuration menu.

2.6.1.5 Super I/O Fan Speed Controller

The Super I/O fan speed controller enables the system to monitor the speed of the fan. One of the pins on the fan connector is reserved for fan speed detection and interfaced to the fan speed controller on the Super I/O. The fan speed is then reported in the BIOS.

2.6.1.6 Super I/O Keyboard/Mouse Controller

The Super I/O keyboard/mouse controller can execute the 8042 instruction set. Some of the keyboard controller features are listed below:

- The 8042 instruction is compatible with a PS/2 keyboard and PS/2 mouse
- Gate A20 and Keyboard reset output
- Supports multiple keyboard power on events
- Supports mouse double-click and/or mouse move power on events

2.6.1.7 Super I/O Parallel Port

The multi-mode high-performance parallel port supports the bi-directional Standard Parallel Port (SPP), the Enhanced Parallel Port (EPP) and the Extended Capabilities Port (ECP) modes.

2.7 PCIe Bus Components

2.7.1 PCIe Bus Overview

The PICOe-GM45A supports the following PCIe devices:

- Four PCIe x1 expansion cards on a compatible backplane
- Two PCIe GbE connections through two Intel® controllers

2.7.2 Intel® ICH9M PCIe Bus Overview

The PICOe-GM45A Intel® ICH9M southbridge PCIe bus is split into one PCIe x4 channel and two PCIe x1 channels. The PCIe x4 channel is connected to a golden finger on the bottom of the CPU card. Two PCIe x1 channels are connected to two Intel® 82574L PCIe Gigabit Ethernet (GbE) controllers.

2.7.3 PCIe x4 Interface Goldfinger

The PCIe x4 from the Intel® ICH9M consists of four lanes. The four lanes are connected to a single golden finger as shown in **Figure 2-13**.

Figure 2-13: PCIe x4 Golden Finger Connection

The PCIe x4 is interfaced to one PCIe x4 expansion card or four PCIe x1 expansion cards on a compatible PICMG 1.3 backplane.

2.7.4 Intel® PC82574L PCIe Gigabit Ethernet (GbE) Controllers

There are two Intel® PC82574L PCIe GbE controllers installed on the PICOe-GM45A. The Intel® PC82574L is interfaced through a PCIe x1 channel to the Intel® ICH9M. The Intel® PC82574L controller is then connected to an RJ-45 Ethernet connector enabling the PICOe-GM45A to be connected to an external network.

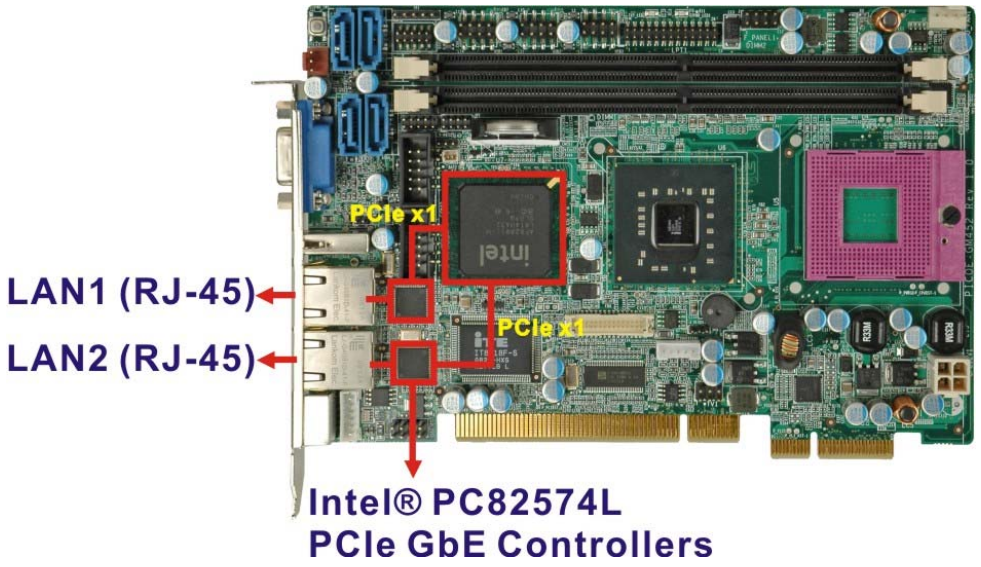


Figure 2-14: Ethernet Controllers

The Intel® PC82574L controller is a low power 10/100/1000 Mbps PCIe GbE controller that is ideal for non-managed platforms. Some of the Intel® PC82574L features are listed below.

- 2 Gbps peak bandwidth per direction
- PCI Express Rev 1.0a specification
- Wide, pipelined internal data path architecture
- Optimized transmit (Tx) and receive (Rx) queues
- 32 KB configurable Rx and Tx first-in/first-out (FIFO)
- IEEE 802.3x*-compliant flow-control support with software controllable pause times and threshold values
- Programmable host memory Rx buffers (256 B-16 KB)
- Descriptor ring management hardware for Tx and Rx
- Mechanism for reducing interrupts from Tx/Rx operations
- Integrated PHY for 10/100/1000 Mbps (full- and half-duplex)
- IEEE 802.3ab* auto-negotiation support
- IEEE 802.3ab PHY compliance and compatibility
- Tx/Rx IP, TCP, and UDP checksum offloading
- Tx TCP segmentation

2.8 Environmental and Power Specifications

2.8.1 System Monitoring

Two thermal inputs on the PICOe-GM45A Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- CPU temperature

Eight voltage inputs on the PICOe-GM45A Super I/O Enhanced Hardware Monitor monitor the following voltages:

- CPU Core
- +1.05V
- +3.30V
- +5.00V
- +12.0 V
- +1.5V
- +1.8V
- 5VSB
- VBAT

The PICOe-GM45A Super I/O Enhanced Hardware Monitor also monitors the following fan speeds:

- CPU Fan speed

The values for the above environmental parameters are all recorded in the BIOS Hardware Health Configuration menu.

2.8.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the PICOe-GM45A are listed below.

- Minimum Operating Temperature: 0ºC (32°F)

- Maximum Operating Temperature: 60°C (140°F)

A heat sink must be installed on the CPU. Thermal paste must be smeared on the lower side of the heat sink before it is mounted on the CPU. Heat sinks are also mounted on the Northbridge and Southbridge chipsets to ensure the operating temperature of these chips remain low.

2.8.3 Power Consumption

Table 2-1 shows the power consumption parameters for the PICOe-GM45A running with a 2.2 GHz Intel® Core™2 Duo processor T7500 with a 800 MHz FSB and two 2.0 GB 800 MHz DDR2 memory.

Voltage	Current
+5V	10.21A
+12V	0.11A

Table 2-1: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions

WARNING!

Failure to take ESD precautions during the installation of the PICOe-GM45A may result in permanent damage to the PICOe-GM45A and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PICOe-GM45A. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PICOe-GM45A, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the PICOe-GM45A, place it on an antic-static pad. This reduces the possibility of ESD damaging the PICOe-GM45A.
- ***Only handle the edges of the PCB***:- When handling the PCB, hold the PCB by the edges.

3.2 Unpacking

3.2.1 Unpacking Precautions

When the PICOe-GM45A is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the PICOe-GM45A does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

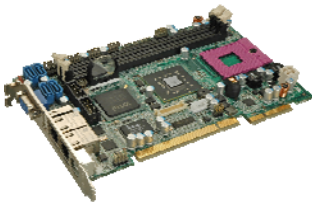
3.3 Unpacking Checklist

NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the PICOe-GM45A was purchased from or contact an IEI sales representative directly by sending an email to sales@iei.com.tw.

3.3.1 Package Contents

The PICOe-GM45A is shipped with the following components:

Quantity	Item and Part Number	Image
1	PICOe-GM45A CPU card	
2	SATA cable (**P/N**: 32000-062800-RS)	
1	SATA power cable (**P/N**: 32100-088600-RS)	
1	KB/MS PS/2 Y-cable (**P/N**: 32000-000138-RS)	
1	Dual RS-232 cable (**P/N**: 19800-000051-RS)	

1	Dual USB cable (w bracket) (**P/N**: CB-USB02-RS)	
1	Mini jumper pack (2.0mm) (**P/N**: 33100-000033-RS)	
1	Utility CD	
1	Quick Installation Guide	

3.3.2 Optional Items

The PICOe-GM45A is shipped with the following components:

Item and Part Number	Image
CPU cooler (**P/N**: CF-479B-RS)	
LPT cable (w/o bracket) (**P/N**: 32200-015100-RS)	
Audio kit_ 7.1 Channel (**P/N**: AC-KIT-883HD-R10)	
HDTV output cables (**P/N**: HDTVCABLESET-01)	

AT 12V Cable (**P/N**: 32100-087100-RS)	

Chapter

4

Connectors

4.1 Peripheral Interface Connectors

Section 4.1.1 shows peripheral interface connector locations. **Section 4.2** lists all the peripheral interface connectors seen in **Section 4.1.1**.

4.1.1 PICOe-GM45A Layout

Figure 4-1 shows the on-board peripheral connectors, rear panel peripheral connectors and on-board jumpers.

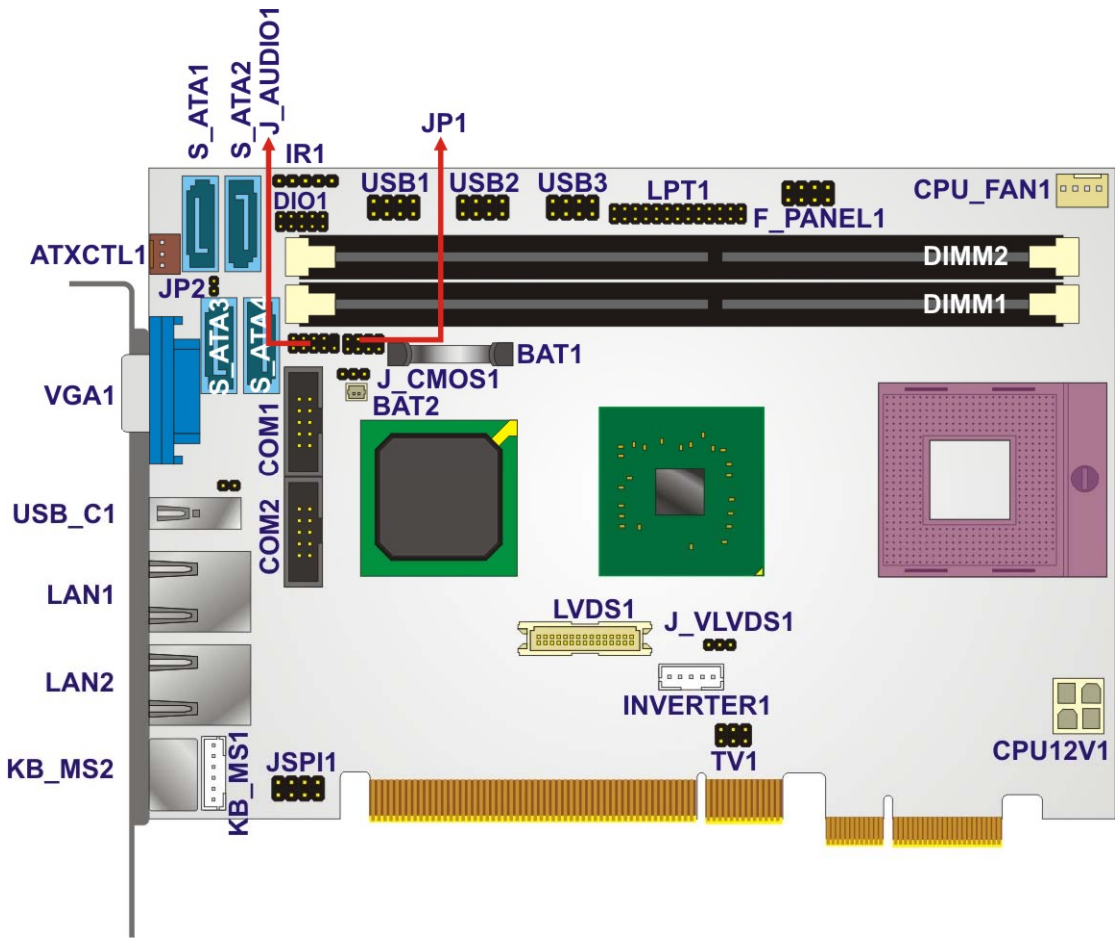


Figure 4-1: Connector and Jumper Locations [Front Side]

Figure 4-2 shows the solder side of the PICOe-GM45A.

Figure 4-2: Connector and Jumper Locations [Solder Side]

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the PICOe-GM45A. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
Audio connector	9-pin header	J_AUDIO1
ATX power control connector	3-pin wafer	ATXCTL1
Backlight inverter connectors	5-pin wafer	INVERTER1
CPU power connector	4-pin connector	CPU12V1
Digital input/output (DIO) connector	10-pin header	DIO1
DDR2 DIMM socket	240-pin socket	DIMM1
DDR2 DIMM socket	240-pin socket	DIMM2
Fan connector	4-pin wafer	CPU_FAN1

Front panel connector	8-pin header	F_PANEL1
Infrared interface (IrDA) connector	5-pin header	IR1
Keyboard/Mouse connector	6-pin wafer	KB_MS1
LVDS connector	30-pin crimp	LVDS1
Parallel port connector	26-pin header	LPT1
Serial ATA (SATA) drive connectors	7-pin SATA	S_ATA1
Serial ATA (SATA) drive connectors	7-pin SATA	S_ATA2
Serial ATA (SATA) drive connectors	7-pin SATA	S_ATA3
Serial ATA (SATA) drive connectors	7-pin SATA	S_ATA4
SDVO connector (solder side)	48-pin crimp	SDVO1
RS-232 serial port connector	10-pin header	COM1
RS-232 serial port connector	10-pin header	COM2
SPI Flash connector	8-pin header	JSPI1
TV Out connector	6-pin header	TV1
USB 2.0 connector	8-pin header	USB1
USB 2.0 connector	8-pin header	USB2
USB 2.0 connector	8-pin header	USB3

Table 4-1: Peripheral Interface Connectors

4.1.3 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the PICOe-GM45A. Detailed descriptions of these connectors can be found in **Section 4.3** on **page 75**.

Connector	Type	Label
Ethernet connector	RJ-45	LAN1
Ethernet connector	RJ-45	LAN2
Keyboard/mouse	PS/2	KB_MS2
USB port	USB port	USB_C1
VGA port connector	15-pin female	VGA1

Table 4-2: Rear Panel Connectors

4.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the CPU card and are only accessible when the CPU card is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the PICOe-GM45A.

4.2.1 ATX Power Supply Enable Connector

CN Label: **ATXCTL1**

CN Type: 3-pin wafer (1x3)

CN Location: See **Figure 4-3**

CN Pinouts: See **Table 4-3**

The ATX power supply enable connector enables the PICOe-GM45A to be connected to an ATX power supply. In default mode, the PICOe-GM45A can only us an AT power supply. To enable an ATX power supply the AT Power Select jumper must also be configured. Please refer to Chapter 3 for more details.

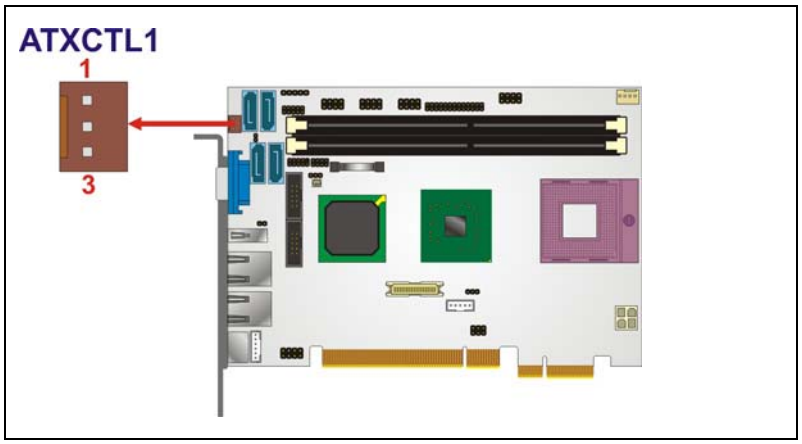


Figure 4-3: ATX Power Supply Enable Connector Location

PIN NO.	DESCRIPTION
1	GND
2	PS-ON
3	+5V Standby

Table 4-3: ATX Power Supply Enable Connector Pinouts

4.2.2 Audio Connector (9-pin)

CN Label: **J_AUDIO1**

CN Type: 9-pin header (2x5)

CN Location: See **Figure 4-4**

CN Pinouts: See **Table 4-4**

The 9-pin audio connector is connected to external audio devices including speakers and microphones for the input and output of audio signals to and from the system.

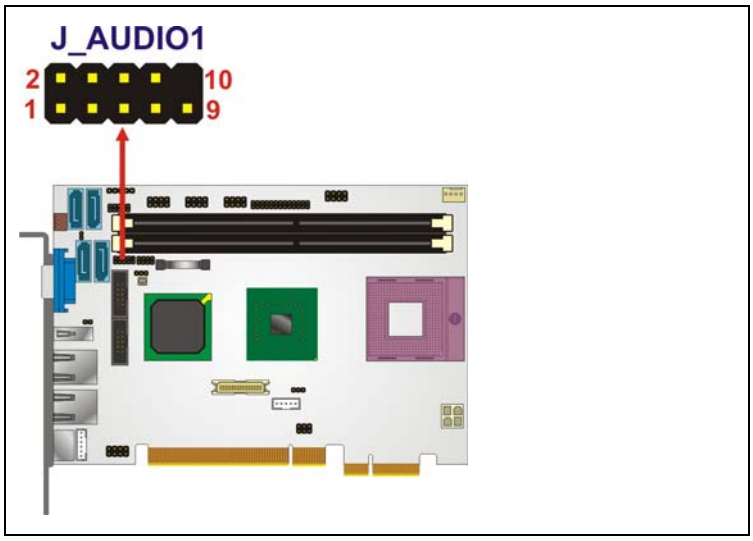


Figure 4-4: Audio Connector Location (9-pin)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	HDA_SYNC	2	HDA_BITCLK
3	HDA_SDOUT	4	SB_SPKR
5	HDA_SDIN0	6	HDA_RST#
7	VCC	8	GND
9	+12V		

Table 4-4: Audio Connector Pinouts (9-pin)

4.2.3 Backlight Inverter Connector

CN Label: **INVERTER1**

CN Type: 5-pin wafer (1x5)

CN Location: See **Figure 4-5**

CN Pinouts: See **Table 4-5**

The backlight inverter connector provides the backlight on the LCD display connected to the PICOe-GM45A with +12V of power.

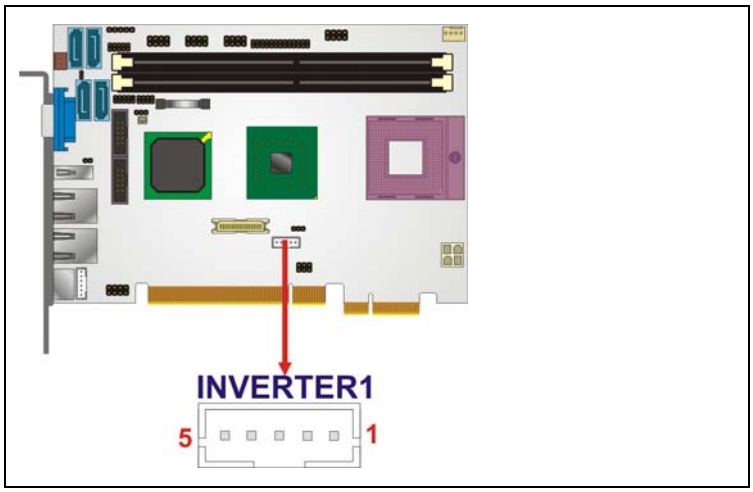


Figure 4-5: Panel Backlight Connector Pinout Locations

PIN NO.	DESCRIPTION
1	LCD Backlight Control
2	GROUND
3	+12V
4	GROUND
5	BACKLIGHT Enable

Table 4-5: Panel Backlight Connector Pinouts

4.2.4 CPU 12V Power Connector

CN Label: **CPU12V1**

CN Type: 4-pin headers (1x4)

CN Location: See **Figure 4-6**

CN Pinouts: See **Table 4-6**

The connector supports the 12V power supply.

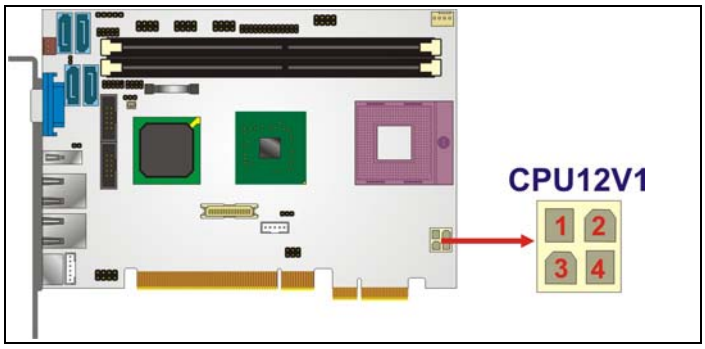


Figure 4-6: CPU 12V Power Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	+12V	4	+12V

Table 4-6: CPU 12V Power Connector Pinouts

4.2.5 Digital Input/Output (DIO) Connector

CN Label: **DIO1**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 4-7**

CN Pinouts: See **Table 4-7**

The digital input/output connector is managed through a Super I/O chip. The DIO connector pins are user programmable.

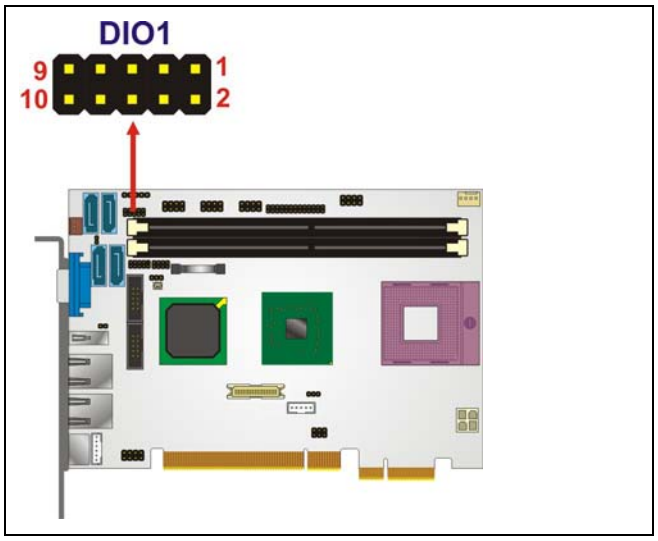


Figure 4-7: DIO Connector Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 4-7: DIO Connector Connector Pinouts

4.2.6 Fan Connector

CN Label: **CPU_FAN1**

CN Type: 4-pin wafer

CN Location: See **Figure 4-8**

CN Pinouts: See **Table 4-8**

The cooling fan connector provides a 12V, 500mA current to the cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

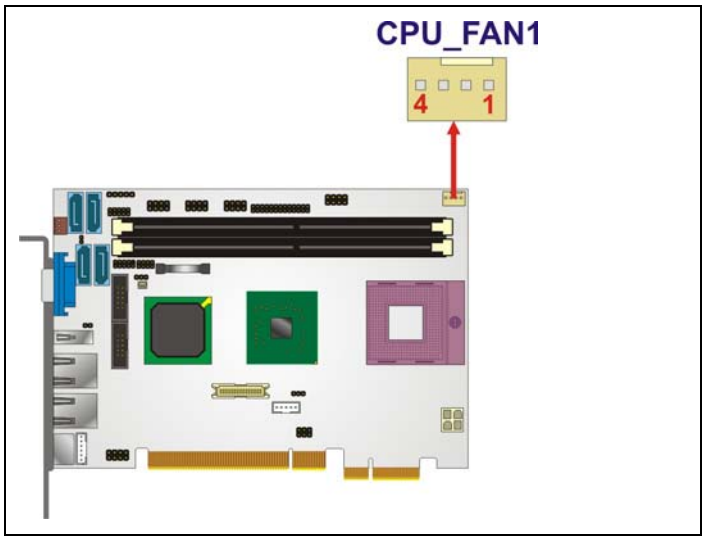


Figure 4-8: +12V Fan Connector Location

PIN NO.	DESCRIPTION
1	GND
2	+12V
3	Fan Speed Detect
4	Control

Table 4-8: +12V Fan Connector Pinouts

4.2.7 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 4-9**

CN Pinouts: See **Table 4-9**

The front panel connector connects to external switches and indicators to monitor and controls the CPU card. These indicators and switches include:

- Power button
- Reset

- Power LED
- HDD LED

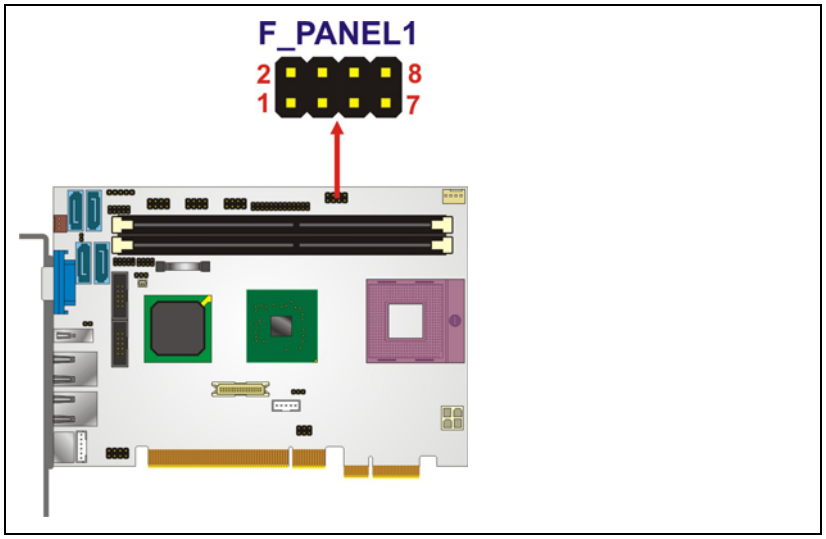


Figure 4-9: Front Panel Connector Pinout Locations (8-pin)

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power Button	1	PWR_BTN+	Power LED	2	PWR_LED+
	3	PWR_BTN-		4	PWR_LED-
HDD LED	5	HDD_LED+	Reset	6	RESET+
	7	HDD_LED-		8	RESET-

Table 4-9: Front Panel Connector Pinouts (8-pin)

4.2.8 Infrared Interface Connector

CN Label: **IR1**

CN Type: 5-pin header (1x5)

CN Location: See **Figure 4-10**

CN Pinouts: See **Table 4-10**

The infrared interface connector supports both Serial Infrared (SIR) and Amplitude Shift Key Infrared (ASKIR) interfaces.

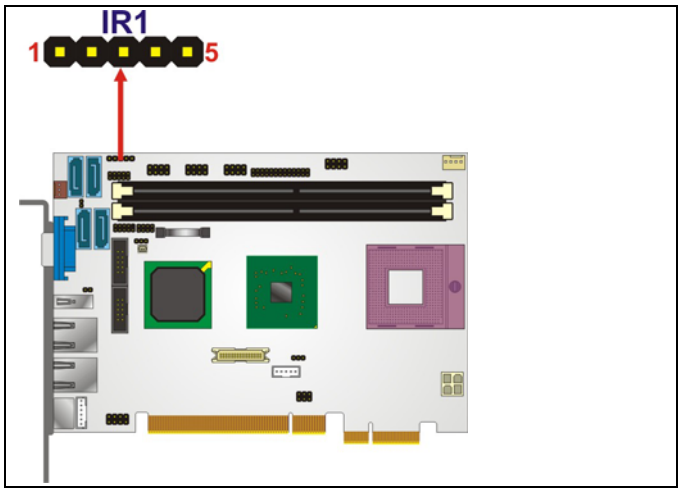


Figure 4-10: Infrared Connector Pinout Locations

PIN NO.	DESCRIPTION
1	VCC
2	NC
3	IR-RX
4	GND
5	IR-TX

Table 4-10: Infrared Connector Pinouts

4.2.9 Keyboard/Mouse Connector

CN Label: **KB_MS1**

CN Type: 6-pin wafer (1x6)

CN Location: See **Figure 4-11**

CN Pinouts: See **Table 4-11**

The keyboard and mouse connector can be connected to a standard PS/2 cable or PS/2 Y-cable to add keyboard and mouse functionality to the system.

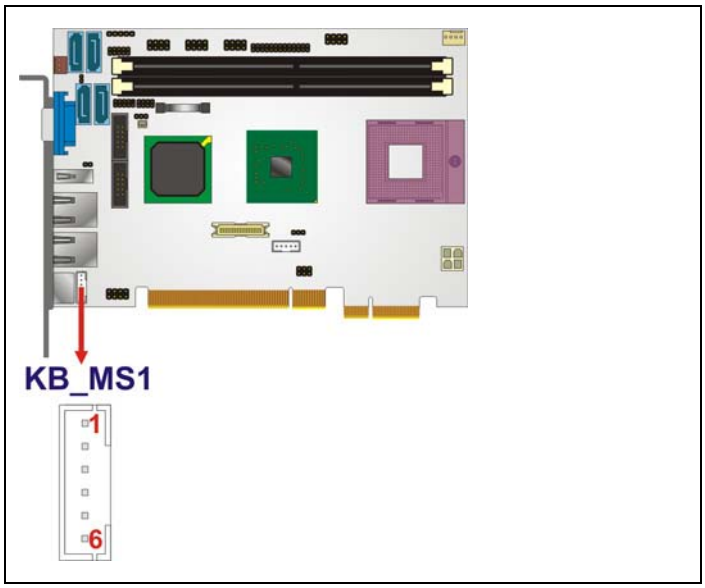


Figure 4-11: Keyboard/Mouse Connector Location

PIN NO.	DESCRIPTION
1	VCC5_KBMS
2	MS DATA
3	MS CLK
4	KB DATA
5	KB CLK
6	GROUND

Table 4-11: Keyboard/Mouse Connector Pinouts

4.2.10 LVDS LCD Connector

CN Label: **LVDS1**

CN Type: 30-pin crimp (3x10)

CN Location: See **Figure 4-12**

CN Pinouts: See **Table 4-12**

The 30-pin LVDS LCD connectors can be connected to single channel or dual channel, 24-bit or 36-bit LVDS panel.

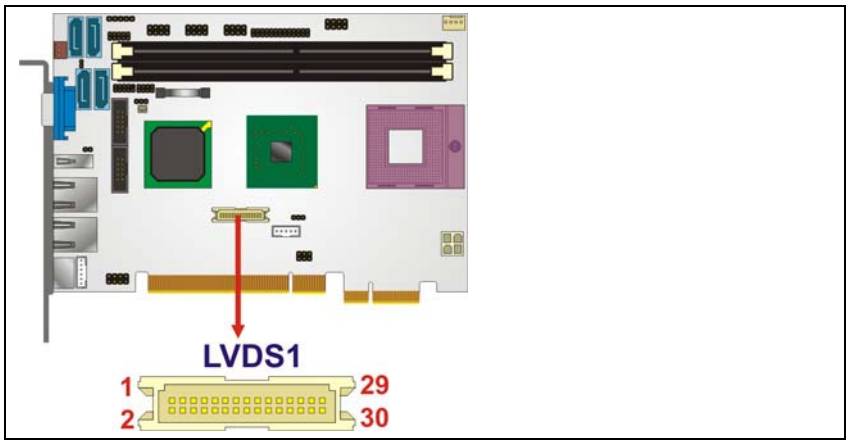


Figure 4-12: LVDS LCD Connector Pinout Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	A_Y0	4	A_Y0#
5	A_Y1	6	A_Y1#
7	A_Y2	8	A_Y2#
9	A_CK	10	A_CK#
11	A_Y3	12	A_Y3#
13	GND	14	GND
15	B_Y0	16	B_Y0#
17	B_Y1	18	B_Y1#
19	B_Y2	20	B_Y2#
21	B_CK	22	B_CK#
23	B_Y3	24	B_Y3#
25	GND	26	GND
27	VCC/VCC1	28	VCC/VCC2
29	VCC/VCC3	30	VCC/VCC4

Table 4-12: LVDS LCD Port Connector Pinouts

4.2.11 Parallel Port Connector

CN Label: **LPT1**

CN Type: 26-pin header

CN Location: See **Figure 4-13**

CN Pinouts: See **Table 4-13**

The 26-pin parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.

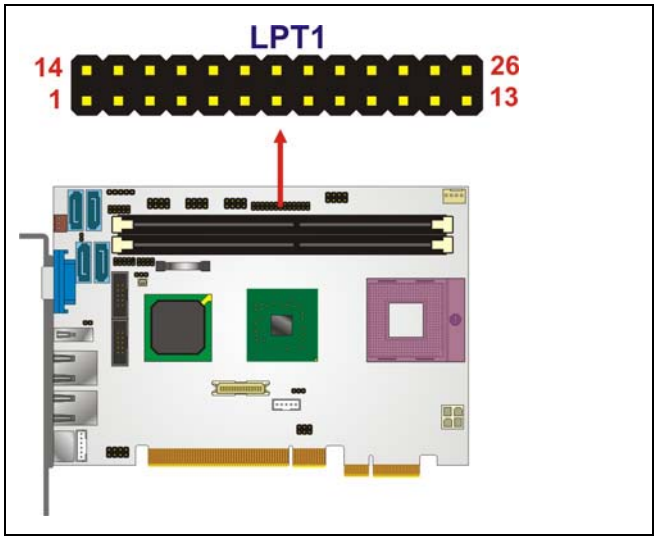


Figure 4-13: Parallel Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	14	AUTO FORM FEED #
2	DATA0	15	ERROR#
3	DATA1	16	INITIALIZE#
4	DATA2	17	PRINTER SELECT LN#
5	DATA3	18	GND
6	DATA4	19	GND
7	DATA5	20	GND
8	DATA6	21	GND

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
9	DATA7	22	GND
10	ACKNOWLEDGE#	23	GND
11	BUSY	24	GND
12	PAPER EMPTY	25	GND
13	PRINTER SELECT	26	NC

Table 4-13: Parallel Port Connector Pinouts

4.2.12 SATA Drive Connectors

CN Label: **S_ATA1**, **S_ATA2**, **S_ATA3** and **S_ATA4**

CN Type: 7-pin SATA drive connectors

CN Location: See **Figure 4-14**

CN Pinouts: See **Table 4-14**

The four SATA II drive connectors are each connected to a SATA II drive. The SATA II drives transfer data at speeds as high as 3.0 Gb/s.

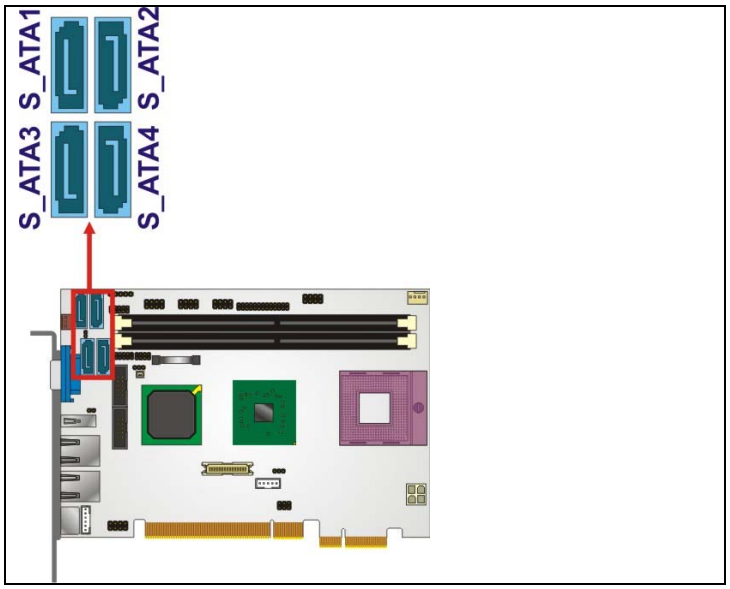


Figure 4-14: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Table 4-14: SATA Drive Connector Pinouts

4.2.13 Serial Port Connectors (COM 1 and COM 2)

CN Label: **COM1** and **COM2**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 4-15**

CN Pinouts: See **Table 4-15**

The 10-pin serial port connector provides a second RS-232 serial communications channel. The COM serial port connectors can be connected to external RS-232 serial port devices.

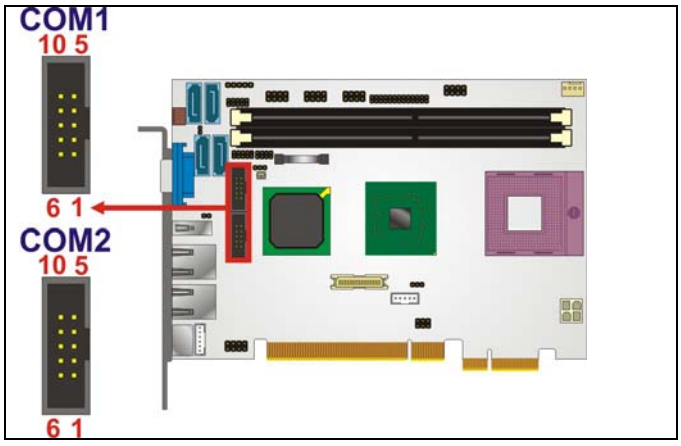


Figure 4-15: COM Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD#	6	DSR#
2	RXD	7	RTS#
3	TXD	8	CTS#
4	DTR#	9	RI#
5	GND	10	NC

Table 4-15: COM Connector Pinouts

4.2.14 SDVO Connector

CN Label: **SDVO1**

CN Type: 47-pin connector (1x47)

CN Location: See **Figure 4-12**

CN Pinouts: See **Table 4-12**

The 47-pin SDVO (Serial Digital Video Out) connector supports additional video signaling interfaces.

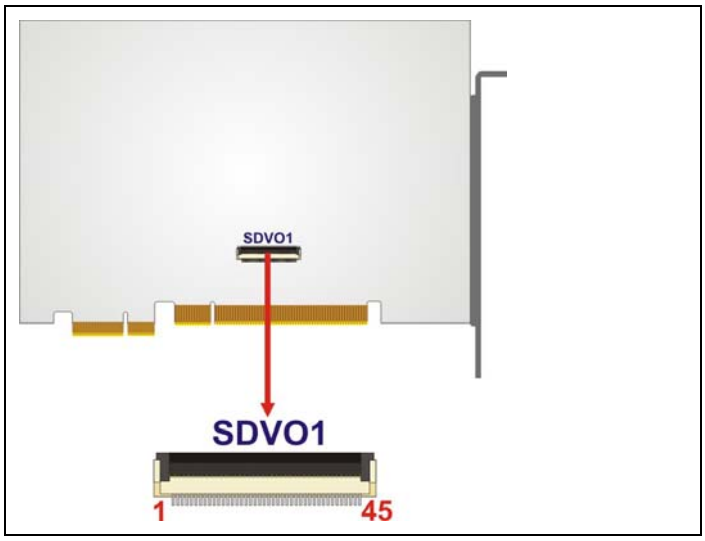


Figure 4-16: SDVO Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	25	GROUND
2	SDVOC_CLK-	26	SDVOB_BLUE-
3	SDVOC_CLK+	27	SDVOB_BLUE+
4	GROUND	28	GROUND
5	SDVOC_GREEN-	29	SDVOB_RED-
6	SDVOC_GREEN+	30	SDVOB_RED+
7	GROUND	31	GROUND
8	SDVOB_CLK-	32	SDVO1_STALL-
9	SDVOB_ CLK+	33	SDVO1_STALL+
10	GROUND	34	GROUND
11	SDVOB_GREEN-	35	SDVO_TVCLKIN-
12	SDVOB_GREEN+	36	SDVO_TVCLKIN+
13	GROUND	37	GROUND
14	SDVOC_INT+	38	SDVO_CLK
15	SDVOC_INT+	39	SDVO_DATA
16	GROUND	40	PCIRST
17	SDVOB_INT+	41	+5VS
18	SDVOB_INT+	42	+5VS
19	GROUND	43	+5VS
20	SDVOC_BLUE-	44	NC
21	SDVOC_BLUE+	45	NC
22	GROUND	46	GROUND
23	SDVOC_RED-	47	GROUND
24	SDVOC_RED+		

Table 4-16: SDVO Connector Pinouts

4.2.15 SPI Flash Connector

CN Label: **JSPI1**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 4-17**

CN Pinouts: See **Table 4-17**

The 8-pin SPI Flash connector is used for the BIOS.

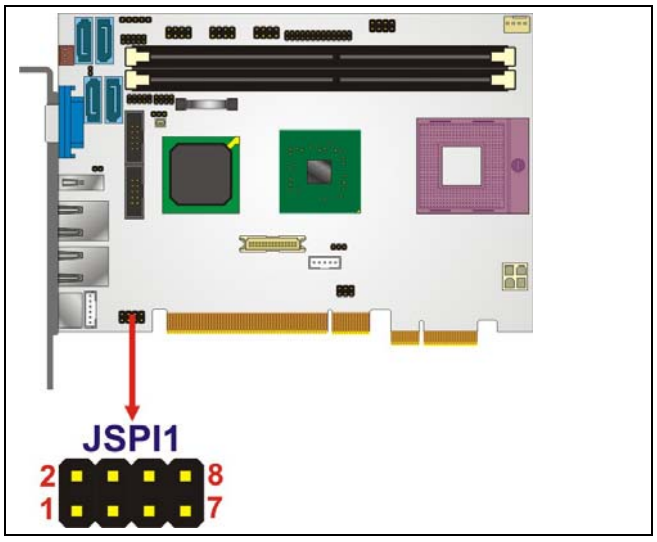


Figure 4-17: SPI Flash Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	3.3V	2	GND
3	CS0	4	CLK
5	SO0	6	SI
7	N/C	8	N/C

Table 4-17: SPI Flash Connector

4.2.16 TV Out Connector

CN Label: **TV1**

CN Type: 6-pin header (2x3)

CN Location: See **Figure 4-18**

CN Pinouts: See **Table 4-18**

The 2x3 pin TV out connector connects to a TV output by using an S-Video or RCA connector. The TV out connector makes displaying media data on a television easier.

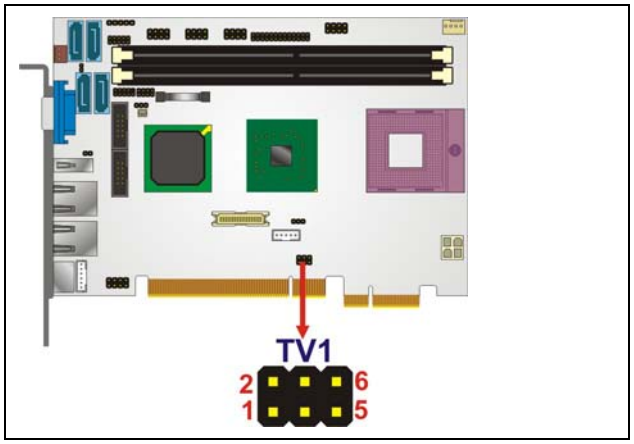


Figure 4-18: TV Connector Pinout Locations

S-Video Connector			
PIN NO.	**DESCRIPTION**	**PIN NO.**	**DESCRIPTION**
1	GND	2	AGREEN_Y
3	GND	4	ARED_C
RCA Connector (only video signal)			
5	GND	6	ABLUE_CVBS

Table 4-18: TV Port Connector Pinouts

4.2.17 USB Connectors (Internal)

CN Label: **USB1**, **USB2** and **USB3**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 4-19**

CN Pinouts: See **Table 4-19**

The 2x4 USB pin connectors each provide connectivity to two USB 1.1 or two USB 2.0 ports. Each USB connector can support two USB devices. Additional external USB ports are found on the rear panel. The USB ports are used for I/O bus expansion.

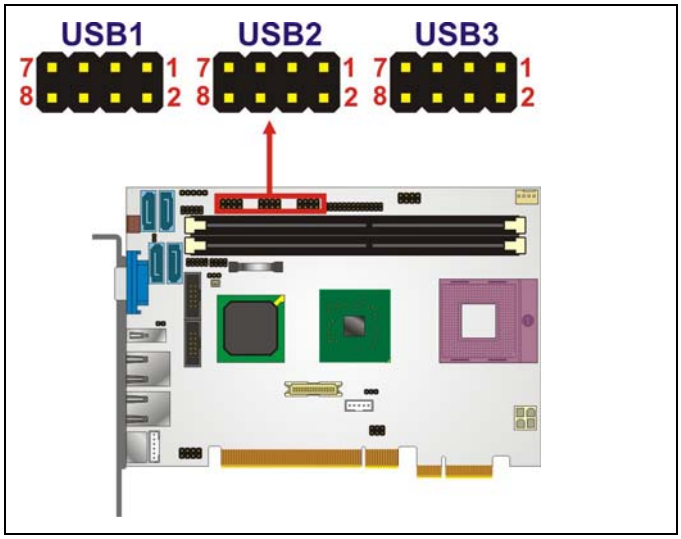


Figure 4-19: USB Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	DATA-	4	DATA+
5	DATA+	6	DATA-
7	GND	8	VCC

Table 4-19: USB Port Connector Pinouts

4.3 External Peripheral Interface Connector Panel

Figure 4-20 shows the PICOe-GM45A external peripheral interface connector (EPIC) panel. The PICOe-GM45A EPIC panel consists of the following:

- 2 x RJ-45 LAN connectors
- 1 x PS/2 connector
- 1 x USB connector
- 1 x VGA connector

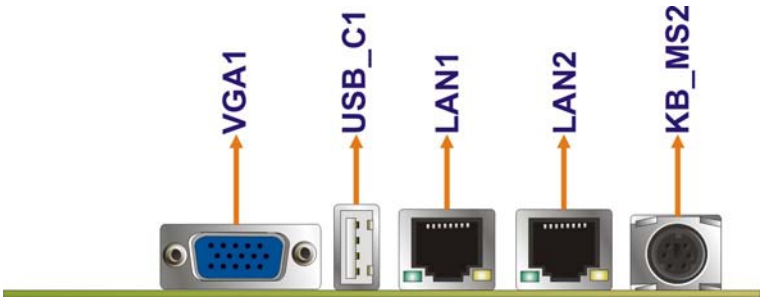


Figure 4-20: PICOe-GM45A External Peripheral Interface Connector

4.3.1 Keyboard/Mouse Connector

CN Label:	**KB_MS2**
CN Type:	PS/2
CN Location:	See **Figure 4-20**
CN Pinouts:	See **Figure 4-21, Table 4-20**

The PICOe-GM45A keyboard and mouse connector is a standard PS/2 connector.

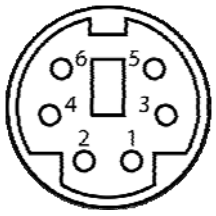


Figure 4-21: PS/2 Pinout and Configuration

PIN	DESCRIPTION
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

Table 4-20: Keyboard Connector Pinouts

4.3.2 LAN Connectors

CN Label: **LAN1** and **LAN2**

CN Type: RJ-45

CN Location: See **Figure 4-20**

CN Pinouts: See **Table 4-21**

The PICOe-GM45A is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

PIN	DESCRIPTION	PIN	DESCRIPTION
1	MDIA3-	5	MDIA1+
2	MDIA3+	6	MDIA2+
3	MDIA2-	7	MDIA0-
4	MDIA1-	8	MDIA0+

Table 4-21: LAN Pinouts

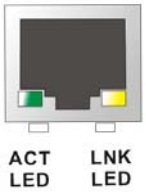


Figure 4-22: RJ-45 Ethernet Connector

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked. See **Table 4-22**.

STATUS	DESCRIPTION	STATUS	DESCRIPTION
GREEN	Activity	YELLOW	Linked

Table 4-22: RJ-45 Ethernet Connector LEDs

4.3.3 USB Connectors

CN Label: **USB_C1**

CN Type: USB port

CN Location: See **Figure 4-20**

CN Pinouts: See **Table 4-23**

The PICOe-GM45A has two external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

PIN NO.	DESCRIPTION
1	VCC
2	DATA-
3	DATA+
4	GND

Table 4-23: USB Port Pinouts

4.3.4 VGA Connector

CN Label: **VGA1**

CN Type: 15-pin Female

CN Location: See **Figure 4-20**

CN Pinouts: See **Figure 4-23** and **Table 4-24**

The PICOe-GM45A has a single 15-pin female connector for connectivity to standard display devices.

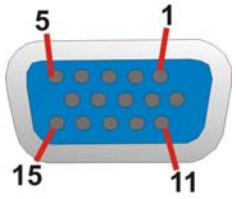


Figure 4-23: VGA Connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	CRT_PLUG-
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 4-24: VGA Connector Pinouts

Chapter

5

Installation

5.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the PICOe-GM45A may result in permanent damage to the PICOe-GM45A and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PICOe-GM45A. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PICOe-GM45A, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the PICOe-GM45A, place it on an antic-static pad. This reduces the possibility of ESD damaging the PICOe-GM45A.
- ***Only handle the edges of the PCB***:-: When handling the PCB, hold the PCB by the edges.

5.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before the PICOe-GM45A is installed. All installation notices pertaining to the installation of the PICOe-GM45A should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the PICOe-GM45A and injury to the person installing the CPU card.

5.2.1 Installation Notices

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the PICOe-GM45A, PICOe-GM45A components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the PICOe-GM45A installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the PICOe-GM45A on an antistatic pad:
  - When installing or configuring the CPU card, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the PICOe-GM45A off:

- When working with the PICOe-GM45A, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the PICOe-GM45A **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

5.2.2 Installation Checklist

The following checklist is provided to ensure the PICOe-GM45A is properly installed.

- All the items in the packing list are present
- A compatible memory module is properly inserted into the slot
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The PICOe-GM45A is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - Primary and secondary IDE device
  - SATA drives
  - Power supply
  - USB cable
  - Serial port cable
- The following external peripheral devices are properly connected to the chassis:
  - VGA screen
  - Keyboard
  - Mouse
  - RS-232 serial communications device
  - USB devices

5.3 Unpacking

When the PICOe-GM45A is unpacked, please check all the unpacking list items listed in Chapter 3 are indeed present. If any of the unpacking list items are not available please contact the PICOe-GM45A vendor reseller/vendor where the PICOe-GM45A was purchased or contact an IEI sales representative.

5.4 CPU, CPU Cooling Kit and DIMM Installation

WARNING:

A CPU should never be turned on without the specified cooling kit being installed. If the cooling kit (heat sink and fan) is not properly installed and the system turned on, permanent damage to the CPU, PICOe-GM45A and other electronic components attached to the system may be incurred. Running a CPU without a cooling kit may also result in injury to the user.

The CPU, CPU cooling kit and DIMM are the most critical components of the PICOe-GM45A. If one of these component is not installed the PICOe-GM45A cannot run.

5.4.1 Socket P CPU Installation

WARNING:

CPUs are expensive and sensitive components. When installing the CPU please be careful not to damage it in anyway. Make sure the CPU is installed properly and ensure the correct cooling kit is properly installed.

To install a socket P CPU onto the PICOe-GM45A, follow the steps below:

WARNING:

When handling the CPU, only hold it on the sides. DO NOT touch the pins at the bottom of the CPU.

Step 1: **Unlock the CPU retention screw.** When shipped, the retention screw of the CPU socket should be in the unlocked position. If it is not in the unlocked position, use a screwdriver to unlock the screw. See **Figure 5-1**.

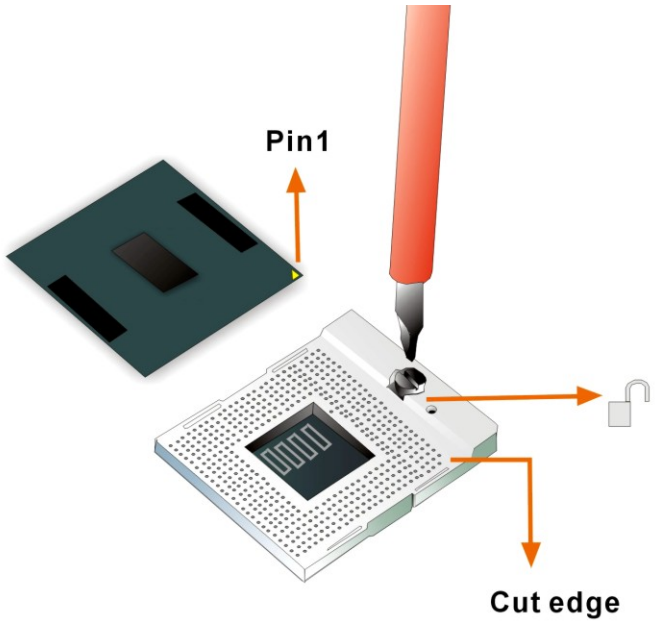


Figure 5-1: Make sure the CPU socket retention screw is unlocked

Step 2: **Inspect the CPU socket.** Make sure there are no bent pins and make sure the socket contacts are free of foreign material. If any debris is found, remove it with compressed air.

Step 3: **Correctly Orientate the CPU**. Make sure the IHS (integrated heat sink) side is facing upwards.

Step 4: **Correctly position the CPU.** Match the Pin 1 mark with the cut edge on the CPU socket. See **Figure 5-1**.

Step 5: **Align the CPU pins.** Carefully align the CPU pins with the holes in the CPU socket.

Step 6: **Insert the CPU.** Gently insert the CPU into the socket. If the CPU pins are properly aligned, the CPU should slide into the CPU socket smoothly.

Step 7: **Lock the retention screw.** Rotate the retention screw into the locked position. See **Figure 5-2**.

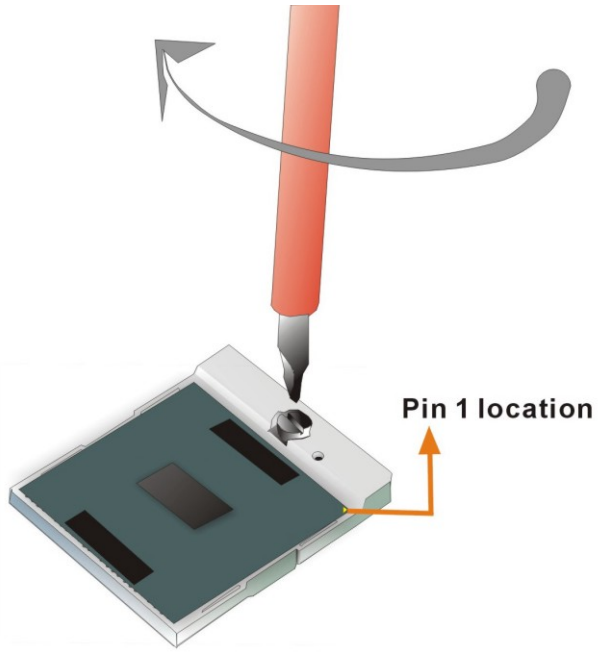


Figure 5-2: Lock the CPU Socket Retention Screw

5.4.2 Socket P Cooling Kit Installation

An IEI Socket P CPU cooling kit can be purchased separately. (See **Chapter 3**) The cooling kit comprises a CPU heat sink and a cooling fan.

WARNING:

Do not wipe off (accidentally or otherwise) the pre-sprayed layer of thermal paste on the bottom of the [Fan model#] heat sink. The thermal

paste between the CPU and the heat sink is important for optimum heat dissipation.

To install the cooling kit, please follow the steps below.

Step 1: **Install the cooling kit bracket**. A cooling kit bracket is installed on the rear of the CPU card. Align the bracket with the four retention holes at the back of the CPU card. Once properly aligned, insert four retention screws from the front of the CPU card.

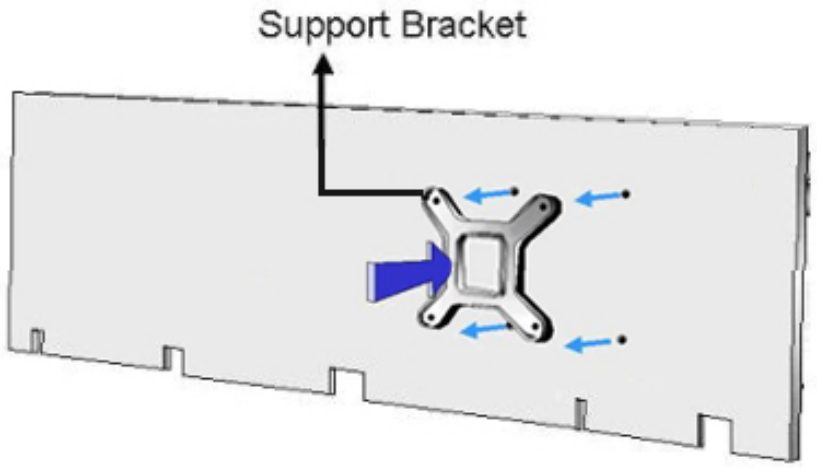


Figure 5-3: Cooling Kit Support Bracket

Step 2: **Open the lever at the top of the heat sink**. Lift the lever at the top of the cooling kit to loosen the cooling kit clamps.

Step 3: **Secure the cooling kit**. Gently place the heat sink and cooling kit onto the CPU. Make sure the hooks are properly secured to the bracket. To secure the cooling kit, close the top lever.

Step 4: **Connect the fan cable**. Connect the cooling kit fan cable to the fan connector on the PICOe-GM45A. Carefully route the cable and avoid heat generating chips and fan blades.

5.4.3 DIMM Installation

WARNING:

Using incorrectly specified DIMM may cause permanently damage the PICOe-GM45A. Please make sure the purchased DIMM complies with the memory specifications of the PICOe-GM45A. DIMM specifications compliant with the PICOe-GM45A are listed in **Chapter 2**.

To install a DIMM into a DIMM socket, please follow the steps below and refer to **Figure 5-4**.

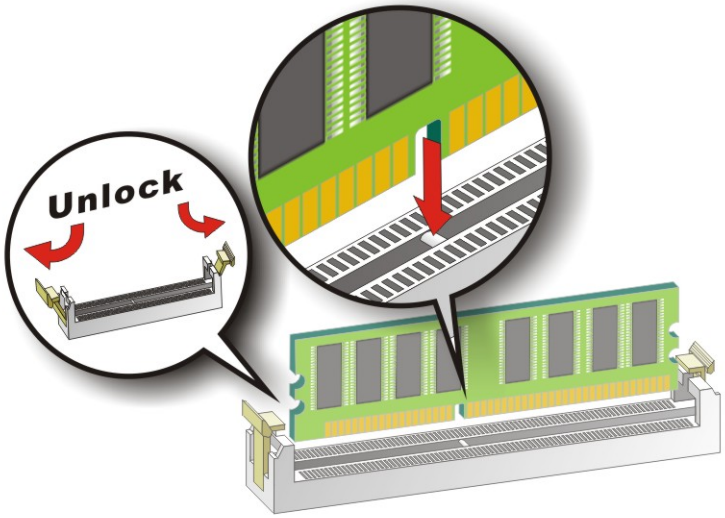


Figure 5-4: Installing a DIMM

Step 1: **Open the DIMM socket handles**. The DIMM socket has two handles that secure the DIMM into the socket. Before the DIMM can be inserted into the socket, the handles must be opened. See **Figure 5-4**.

Step 2: **Align the DIMM with the socket**. The DIMM must be oriented in such a way that the notch in the middle of the DIMM must be aligned with the plastic bridge in the socket. See **Figure 5-4**.

Step 3: **Insert the DIMM**. Once properly aligned, the DIMM can be inserted into the socket. As the DIMM is inserted, the white handles on the side of the socket will close automatically and secure the DIMM to the socket. See **Figure 5-4**.

Step 4: **Removing a DIMM**. To remove a DIMM, push both handles outward. The memory module is ejected by a mechanism in the socket.

5.5 Jumper Settings

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

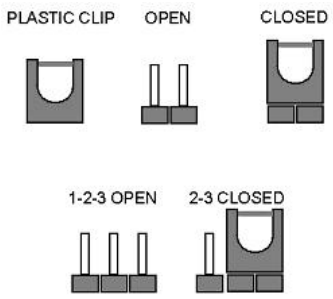


Figure 5-5: Jumper Locations

Before the PICOe-GM45A is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the PICOe-GM45A are listed in **Table 5-1**.

Description	Label	Type
AT Power Mode Setting	ATXCTL1	3-pin wafer
Clear CMOS	J_CMOS1	3-pin header
LVDS Panel Resolution	JP1	8-pin header
LVDS Voltage Select	J_VLVDS1	3-pin header
PCIe Status Select	JP2	2-pin header

Table 5-1: Jumpers

5.5.1 AT Power Select Jumper Settings

NOTE:

The AT Power Select Jumper is the same as the ATX Enable connector.

Jumper Label: **ATXCTl1**

Jumper Type: 3-pin wafer

Jumper Settings: See **Table 5-2**

Jumper Location: See **Figure 5-6**

The AT Power Select jumper specifies the systems power mode as AT or ATX. Use a jumper cap to short pin 1 - pin 2 on the ATXCTL1 connector to enable the AT Power mode on the system. In the ATX mode use the PS_ON- and 5VSB cable. AT Power Select jumper settings are shown in **Table 5-2**.

AT Power Select	Description	
Short 1 – 2	Use AT power	Default
Open	Use ATX power	

Table 5-2: AT Power Select Jumper Settings

The location of the AT Power Select jumper is shown in **Figure 5-6** below.

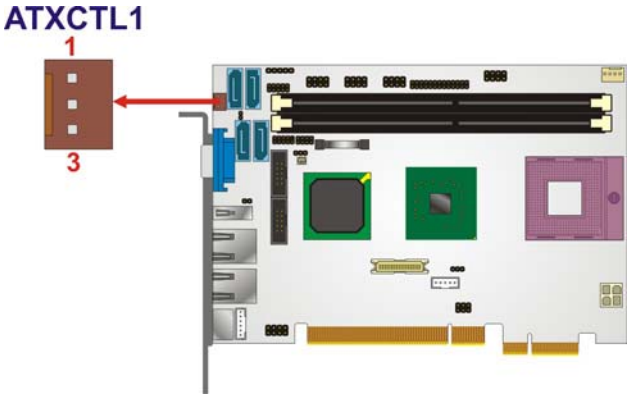


Figure 5-6: AT Power Select Jumper Location

5.5.2 Clear CMOS Jumper

Jumper Label:	**J_CMOS1**
Jumper Type:	3-pin header
Jumper Settings:	See **Table 5-3**
Jumper Location:	See **Figure 5-7**

If the PICOe-GM45A fails to boot due to improper BIOS settings, the clear CMOS jumper clears the CMOS data and resets the system BIOS information. To do this, use the jumper cap to close pins 2 and 3 for a few seconds then reinstall the jumper clip back to pins 1 and 2.

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults
- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

The clear CMOS jumper settings are shown in **Table 5-3**.

Clear CMOS	Description	
Short 1 - 2	Keep CMOS Setup	Default
Short 2 - 3	Clear CMOS Setup	

Table 5-3: Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 5-7** below.

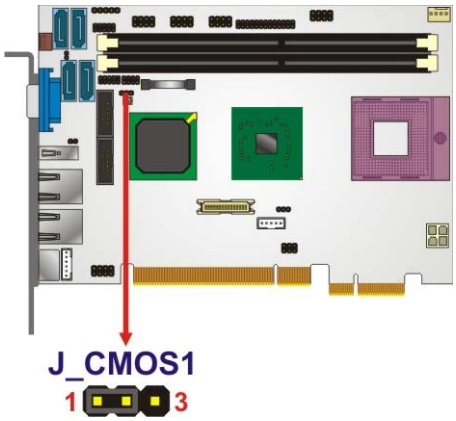


Figure 5-7: Clear CMOS Jumper

5.5.3 LVDS Panel Resolution Jumper

Jumper Label: **JP1**

Jumper Type: 8-pin header

Jumper Settings: See **Table 5-4**

Jumper Location: See **Figure 5-8**

The LVDS Panel Resolution jumper allows the resolution of the LVDS screens connected to the LVDS1 connector to be configured. The LVDS Panel Resolution jumper settings are shown in **Table 5-4**.

JP1	Description	
Open	640 x 480 (18-bit)	
Short 1-2	800 x 600 (18-bit)	Default

Short 3-4	1024 x 768 (18-bit)	
Short 1-2, 3-4	1024 x 768 (24-bit)	
Short 5-6	1024 x 768 (36-bit)	
Short 1-2, 5-6	1280 x 1024 (48-bit)	
Short 3-4, 5-6	1600 x 1200 (48-bit)	
Short 1-2, 3-4, 5-6	1280 x 768 (18-bit)	
Short 7-8	1280 x 800 (18-bit)	
Short 1-2, 7-8	1366 x 768 (24-bit)	
Short 3-4, 7-8	1440 x 900 (36-bit)	
Short 1-2, 3-4, 7-8	1440 x 900 (48-bit)	
Short 5-6, 7-8	1680 x 1050 (48-bit)	
Short 1-2, 5-6, 7-8	1920 x 1080 (48-bit)	
Short 3-4, 5-6, 7-8	1920 x 1200 (48-bit)	

Table 5-4: LVDS Panel Resolution Jumper Settings

The LVDS Panel Resolution jumper location is shown in **Figure 5-8**.

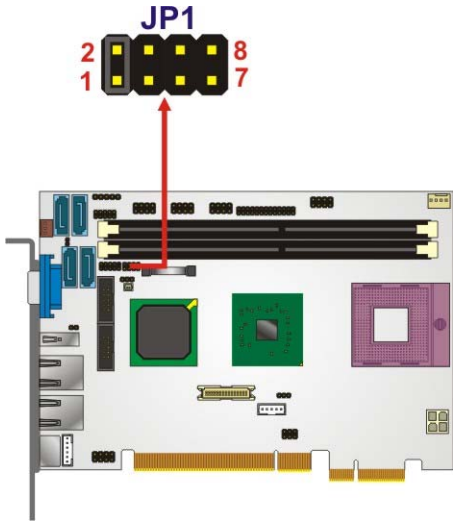


Figure 5-8: LVDS Panel Resolution Jumper Pinout Locations

5.5.4 LVDS Voltage Selection

WARNING:

Permanent damage to the screen and PICOe-GM45A may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that cam with the monitor to select the correct voltage.

Jumper Label: **J_VLVDS1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-5**

Jumper Location: See **Figure 5-9**

The **LVDS Voltage Selection** jumpers allow the LVDS screen voltages to be set. J_VLVDS1 sets the voltage connected to LVDS1. The **LVDS Voltage Selection** jumper settings are shown in **Table 5-5**.

LCD Voltage Select	Description	
Short 1-2	+3.3V LVDS	Default
Short 2-3	+5V LVDS	

Table 5-5: LVDS Voltage Selection Jumper Settings

The LVDS Voltage Selection jumper location is shown in **Figure 5-9**.

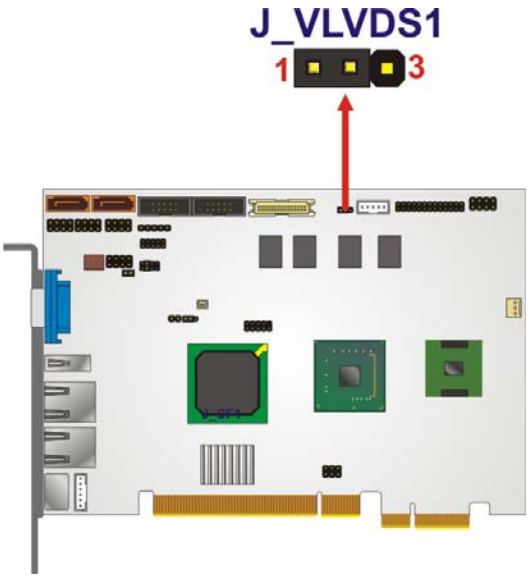


Figure 5-9: LVDS Voltage Selection Jumper Pinout Locations

5.5.5 PCIe Status Select

Jumper Label: **JP2**

Jumper Type: 2-pin header

Jumper Settings: See **Table 5-6**

Jumper Location: See **Figure 5-10**

The **PCIe Status Select** jumper allows the PCIe status to be configured. The **PCIe Status Select** jumper settings are shown in **Table 5-5**.

PCIe Status Select	Description	
Open	One PCIe x4	
Short	Four PCIe x1	Default

Table 5-6: PCIe Status Select Jumper Settings

The PCIe Status Select jumper location is shown in **Figure 5-9**.

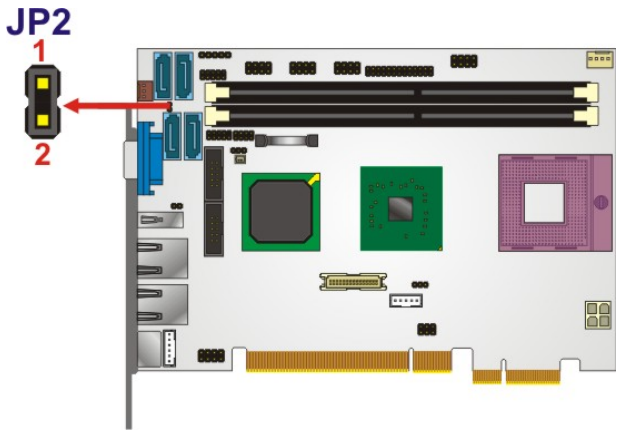


Figure 5-10: PCIe Status Select Jumper Pinout Locations

5.6 Chassis Installation

5.6.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the PICOe-GM45A must have air vents to allow cool air to move into the system and hot air to move out.

The PICOe-GM45A must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

5.6.2 Backplane Installation

Before the PICOe-GM45A can be installed into the chassis, a backplane must first be installed. Please refer to the installation instructions that came with the backplane and the chassis to see how to install the backplane into the chassis.

NOTE:

IEI has a wide range of backplanes available. Please contact your PICOe-GM45A vendor, reseller or an IEI sales representative at sales@iei.com.tw or visit the IEI website (http://www.ieiworld.com.tw) to find out more about the available chassis.

5.6.3 CPU Card Installation

To install the PICOe-GM45A CPU card onto the backplane, carefully align the CPU card interface connectors with the corresponding socket on the backplane. To do this, please refer to the reference material that came with the backplane. Next, secure the CPU card to the chassis. To do this, please refer to the reference material that came with the chassis.

5.7 Internal Peripheral Device Connections

5.7.1 Peripheral Device Cables

The cables listed in **Table 5-7** are shipped with the PICOe-GM45A.

Quantity	Type
1	Keyboard and Mouse cable
2	SATA drive cable
1	SATA power cable
1	Dual port USB cable
1	Dual RS-232 cable

Table 5-7: IEI Provided Cables

Some optional items that can be purchased separately and installed on the PICOe-GM45A include:

- AT 12 V cable
- Parallel port cable
- HDTV out cable
- 7.1 channel audio kit

5.7.2 7.1 Channel Audio Kit Installation

NOTE:

This is an optional item that must be ordered separately. For further information please contact the nearest PICOe-GM45A distributor, reseller or vendor or contact an iEi sales representative directly. Send any queries to sales@iei.com.tw.

The optional 7.1 channel audio kit connects to the 10-pin audio connector on the PICOe-GM45A. The audio kit consists of five audio jacks. One audio jack, Mic In, connects to a microphone. The remaining four audio jacks, Line-In, Front-Out, Rear-Out, and Center Subwoofer, connect to speakers. To install the audio kit, please refer to the steps below:

Step 1: **Connect the audio kit cable.** The audio kit is shipped with a cable that connects the audio kit to the PICOe-GM45A. Connect the cable to the connector on the back of the audio kit. Make sure the pins are properly aligned (i.e. pin 1 connects to pin 1).

Step 2: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 3: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit cable connector. Pin 1 on the audio kit cable connector is indicated with a white dot. See **Figure 5-11**.

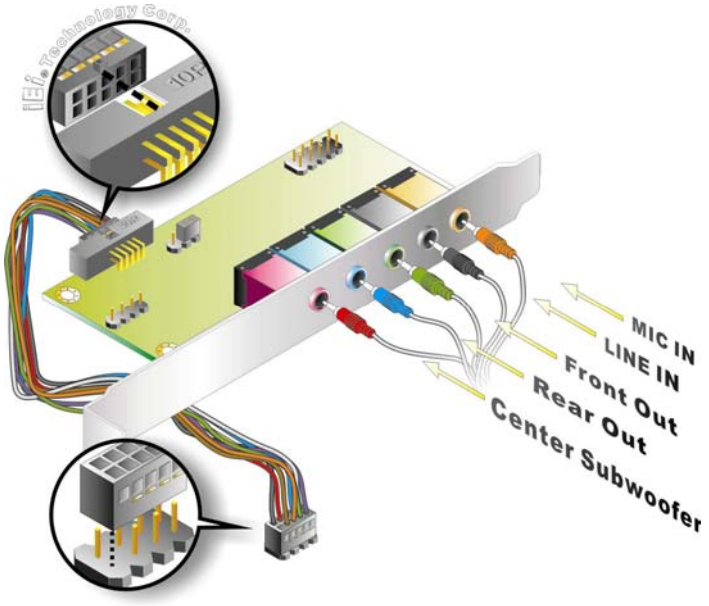


Figure 5-11: 7.1 Channel Audio Kit

Step 4: **Mount the audio kit onto the chassis**. Once the audio kit is connected to the PICOe-GM45A, secure the audio kit bracket to the system chassis.

Step 5: **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

Step 6: **Install the driver**. If the 7.1 channel audio kit is used, the ALC883 Realtek codec driver must be installed. Refer to **Chapter 7** for driver installation instructions.

5.7.3 SATA Drive Connection

The PICOe-GM45A is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the onboard SATA drive

connector. See **Figure 5-12**.

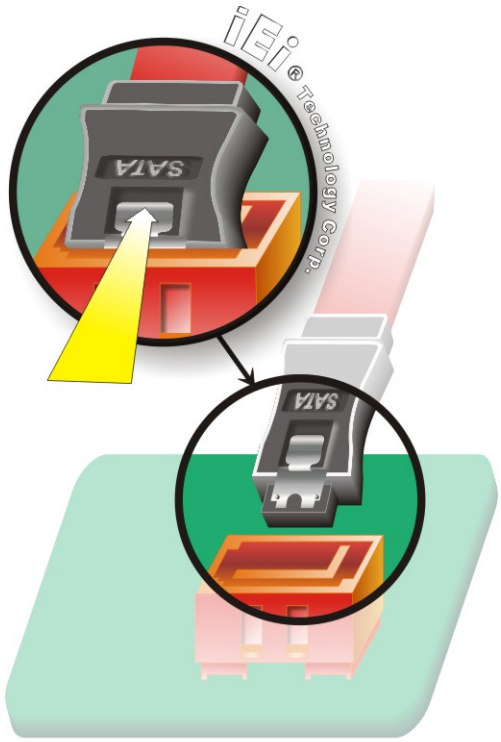


Figure 5-12: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 5-13**.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-13**.

Figure 5-13: SATA Power Drive Connection

5.7.4 USB Cable (Dual Port) with Slot Bracket

The PICOe-GM45A is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the USB connectors are shown in **Chapter 3**.

WARNING:

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors**. The cable has two connectors. Correctly align pin 1on each cable connector with pin 1 on the PICOe-GM45A USB connector.

Step 3: **Insert the cable connectors** Once the cable connectors are properly aligned with the USB connectors on the PICOe-GM45A, connect the cable connectors to the on-board connectors. See **Figure 5-14**.

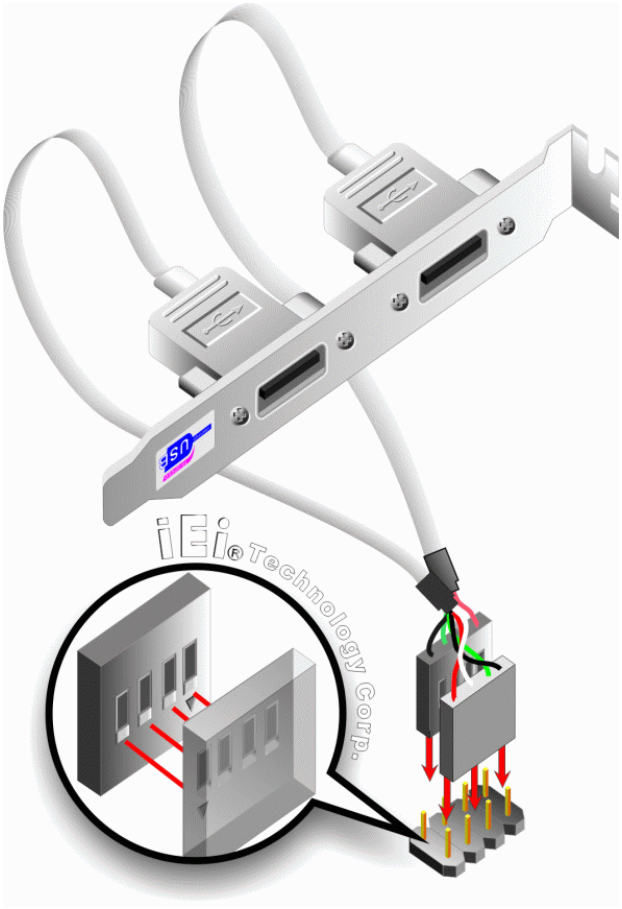


Figure 5-14: Dual USB Cable Connection

Step 4: **Attach the bracket to the chassis**. The USB 2.0 connectors are attached to a bracket. To secure the bracket to the chassis please refer to the installation instructions that came with the chassis.

5.7.5 Parallel Port Cable without Bracket

The optional parallel port (LPT) cable respectively connects the on-board LPT 26-pin box header to an external LPT device (like a printer). The cable comprises a 26-pin female header, to be connected to the on-board LPT box-header, on one side and on the other side a standard external LPT connector. To connect the LPT cable, please follow the steps below.

Step 1: **Locate the connector**. The LPT connector location is shown in **Chapter 4**.

Step 2: **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on the PICOe-GM45A LPT box-header connector. See Figure 5-15.

Step 3: **Insert the cable connectors** Once the cable connector is properly aligned with the 26-pin box-header connector on the PICOe-GM45A, connect the cable connector to the on-board connector. See **Figure 5-15.**

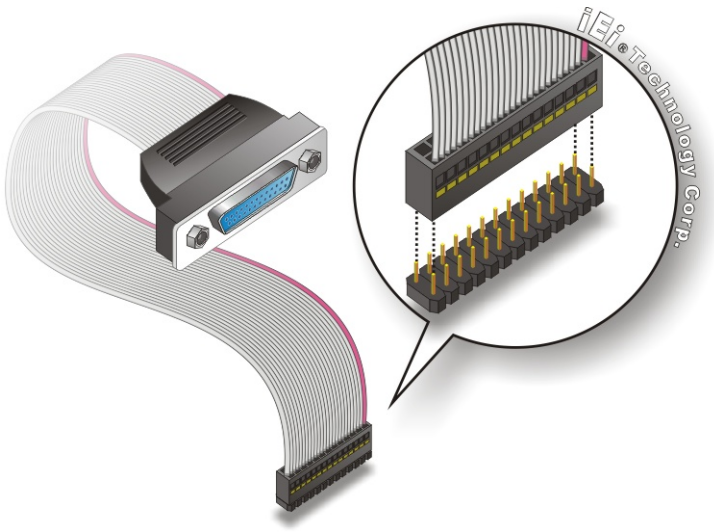


Figure 5-15: LPT Cable Connection

Step 4: **Attach the LPT connector to the chassis**. To secure the LPT interface connector to the chassis please refer to the installation instructions that came with the chassis.

Step 5: **Connect LPT device**. Once the LPT interface connector is connected to the chassis, the LPT device can be connected to the LPT interface connector. See **Figure 5-16**

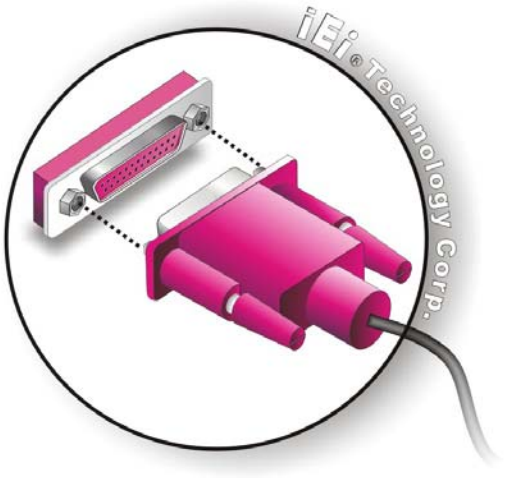


Figure 5-16: Connect the LPT Device

5.7.6 Dual RS-232 Cable with Slot Bracket

The dual RS-232 cable slot connector consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9 male connector that is mounted onto a slot. To install the dual RS-232 cable, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the RS-232 connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connectors**. Insert one connector into each serial port box headers. See **Figure 5-17**. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

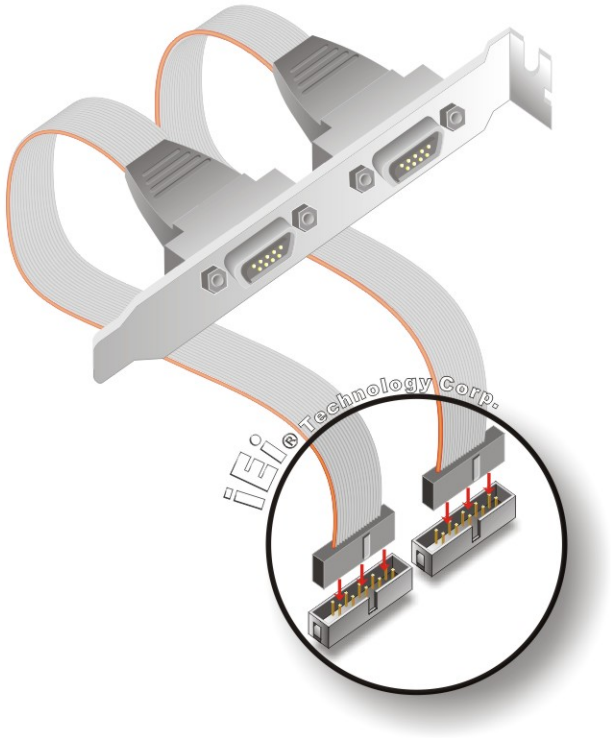


Figure 5-17: Dual RS-232 Cable Installation

Step 3: **Secure the bracket**. The dual RS-232 connector has two D-sub 9 male connectors secured on a bracket. To secure the bracket to the chassis please refer to the reference material that came with the chassis

5.8 External Peripheral Interface Connection

The following external peripheral devices can be connected to the external peripheral interface connectors.

- RJ-45 Ethernet cable connectors
- PS/2 devices
- USB devices
- VGA monitors

To install these devices, connect the corresponding cable connector from the actual device to the corresponding PICOe-GM45A external peripheral interface connector making sure the pins are properly aligned.

5.8.1 LAN Connection (Single Connector)

There are two external RJ-45 LAN connectors. The RJ-45 connectors enable connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: **Locate the RJ-45 connectors**. The locations of the USB connectors are shown in **Chapter 4**.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the PICOe-GM45A. See **Figure 5-18**.

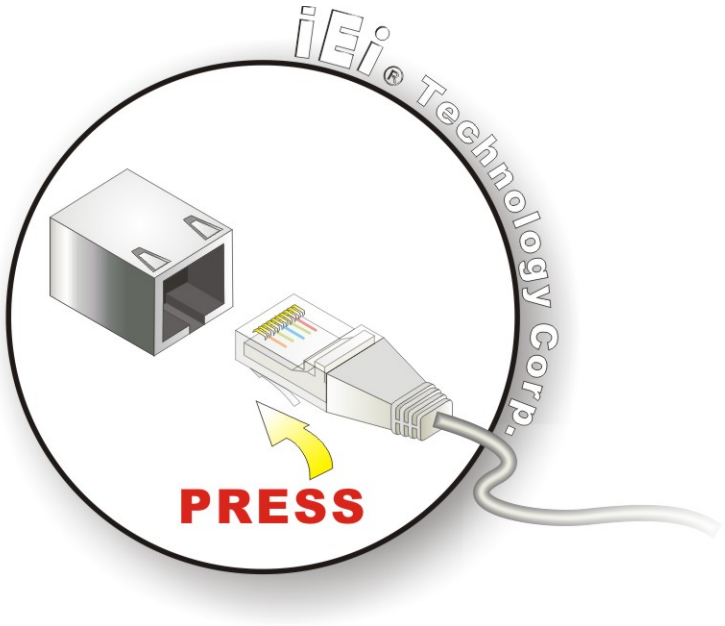


Figure 5-18: LAN Connection

Step 3: **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN cable RJ-45 connector into the onboard RJ-45 connector.

5.8.2 PS/2 Y-Cable Connection

The PICOe-GM45A has a PS/2 connector on the external peripheral interface panel. The dual PS/2 connector is connected to the PS/2 Y-cable that came with the PICOe-GM45A. One of the PS/2 cables is connected to a keyboard and the other to a mouse to the system. Follow the steps below to connect a keyboard and mouse to the PICOe-GM45A.

Step 1: **Locate the dual PS/2 connector**. The location of the PS/2 connector is shown in **Chapter 3**.

Step 2: **Insert the keyboard/mouse connector**. Insert the PS/2 connector on the end of the PS/2 y-cable into the external PS/2 connector. See **Figure 5-19**.

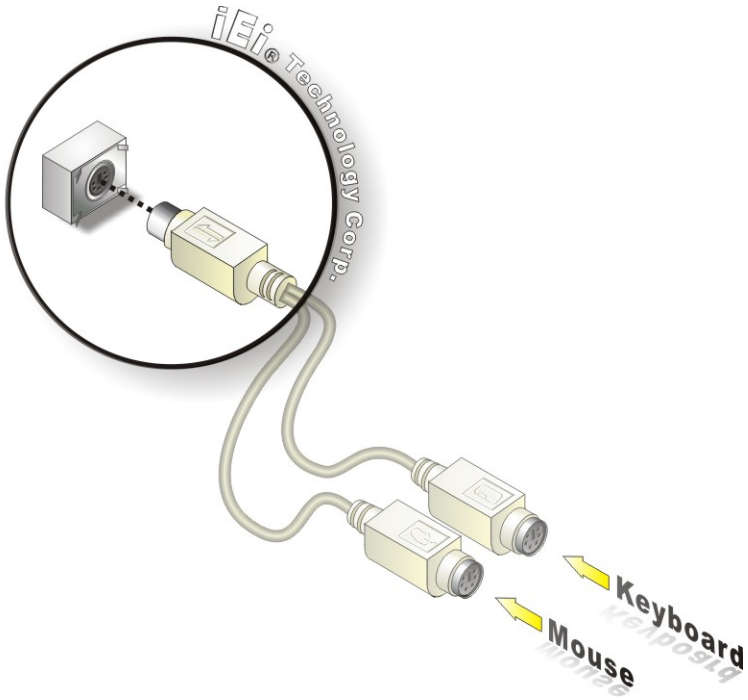


Figure 5-19: PS/2 Keyboard/Mouse Connector

Step 3: **Connect the keyboard and mouse**. Connect the keyboard and mouse to the appropriate connector. The keyboard and mouse connectors can be distinguished from each other by looking at the small graphic at the top of the connector.

5.8.3 USB Connection (Dual Connector)

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the PICOe-GM45A.

Step 1: **Locate the USB Series "A" receptacle connectors**. The location of the USB

Series "A" receptacle connectors are shown in **Chapter 3**.

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See **Figure 5-20**.

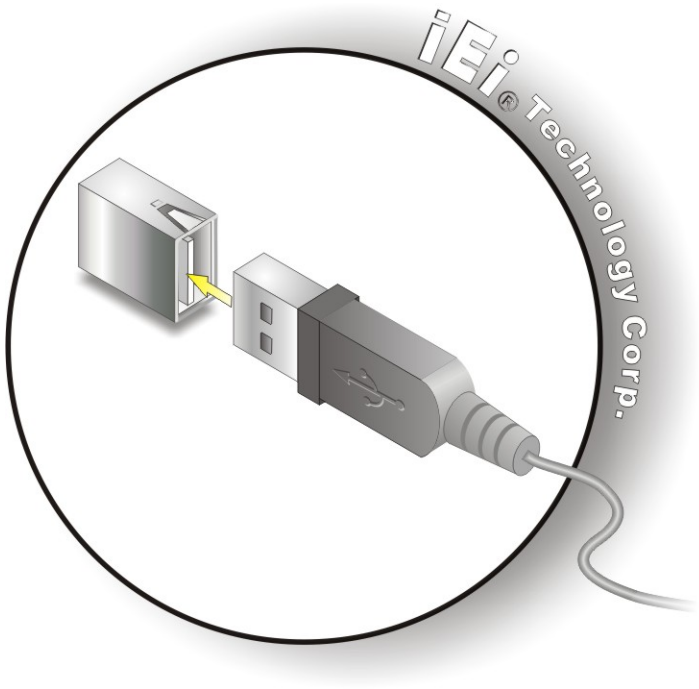


Figure 5-20: USB Connector

5.8.4 VGA Monitor Connection

The PICOe-GM45A has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the PICOe-GM45A, please follow the instructions below.

Step 1: **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

Step 2: **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

Step 3: **Insert the VGA connector**. Once the connectors are properly aligned with the

insert the male connector from the VGA screen into the female connector on the PICOe-GM45A. See **Figure 5-21**.

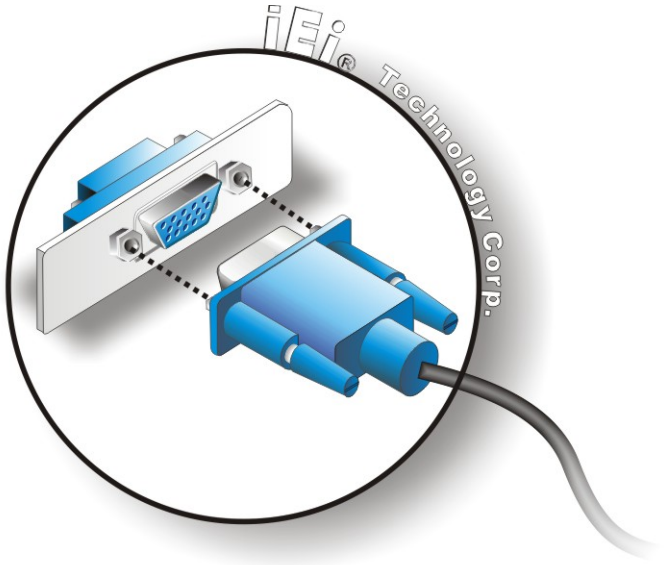


Figure 5-21: VGA Connector

Step 4: **Secure the connector**. Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

Chapter

6

BIOS Screens

6.1 Introduction

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

6.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** key is pressed, restart the computer and try again.

6.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
Page Up key	Increase the numeric value or make changes
Page Dn key	Decrease the numeric value or make changes

F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward.
F10 key	Save all the CMOS changes, only for Main Menu

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

6.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in **Chapter 5**.

6.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

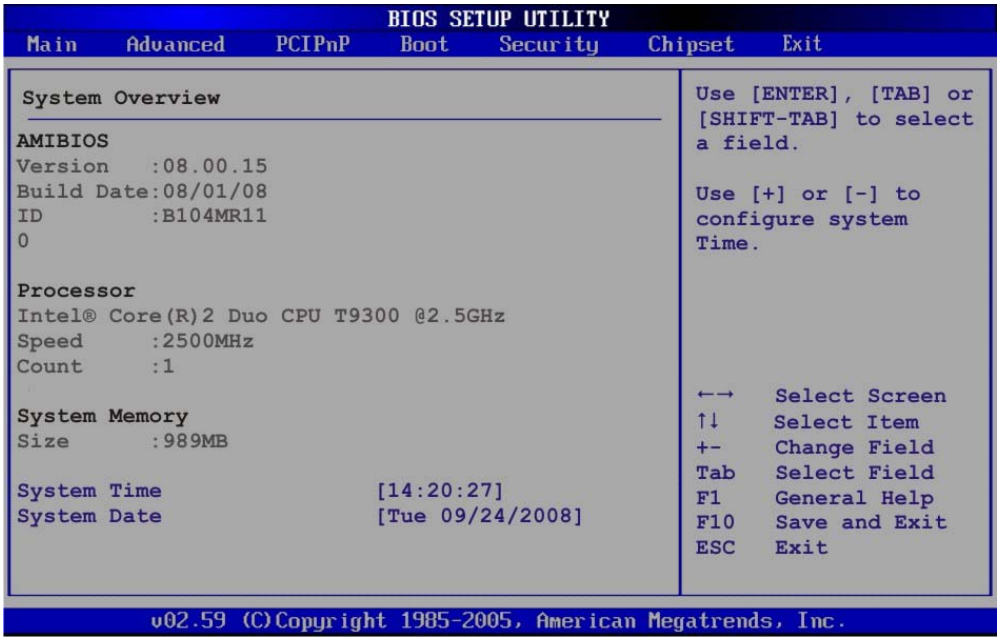
- **Main** Changes the basic system configuration.
- **Advanced** Changes the advanced system settings.
- **PCIPnP** Changes the advanced PCI/PnP Settings
- **Boot** Changes the system boot configuration.
- **Security** Sets User and Supervisor Passwords.
- **Chipset** Changes the chipset settings.
- **Exit** Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

6.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered.

The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

➔ System Overview

The **System Overview** lists a brief summary of different system components. The fields in **System Overview** cannot be changed. The items shown in the system overview include:

- **AMI BIOS**: Displays auto-detected BIOS information
  - Version: Current BIOS version
  - Build Date: Date the current BIOS version was made
  - ID: Installed BIOS ID
- **Processor**: Displays auto-detected CPU specifications
  - Type: Names the currently installed processor
  - Speed: Lists the processor speed
  - Count: The number of CPUs on the CPU card
- **System Memory**: Displays the auto-detected system memory.

- Size: Lists memory size

The System Overview field also has two user configurable fields:

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

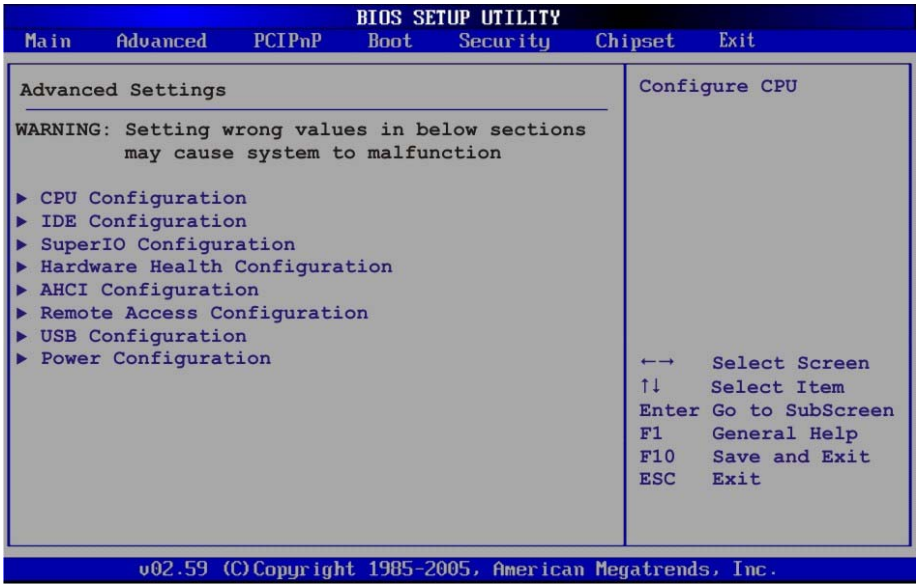
6.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING:

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

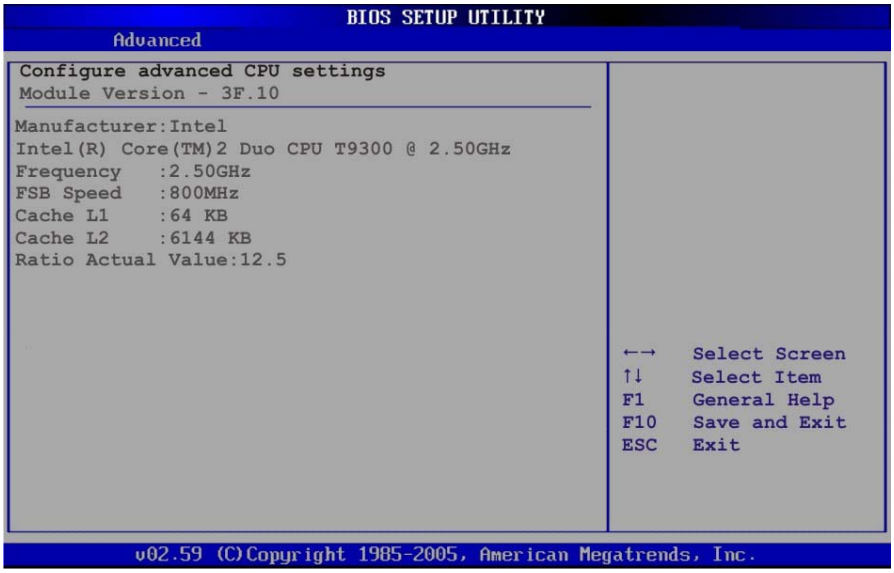
- CPU Configuration (see **Section 6.3.1**)
- IDE Configuration (see **Section 6.3.2**)
- SuperIO Configuration (see **Section 6.3.3**)
- Hardware Health Configuration (see **Section 6.3.4**)
- AHCI Configuration (see **Section 6.3.5**)
- Remote Access Configuration (see **Section 6.3.6**)
- USB Configuration (see **Section 6.3.7**)
- Power Configuration (see **Section 6.3.8**)



BIOS Menu 2: Advanced

6.3.1 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 3**) to view detailed CPU specifications and configure the CPU.



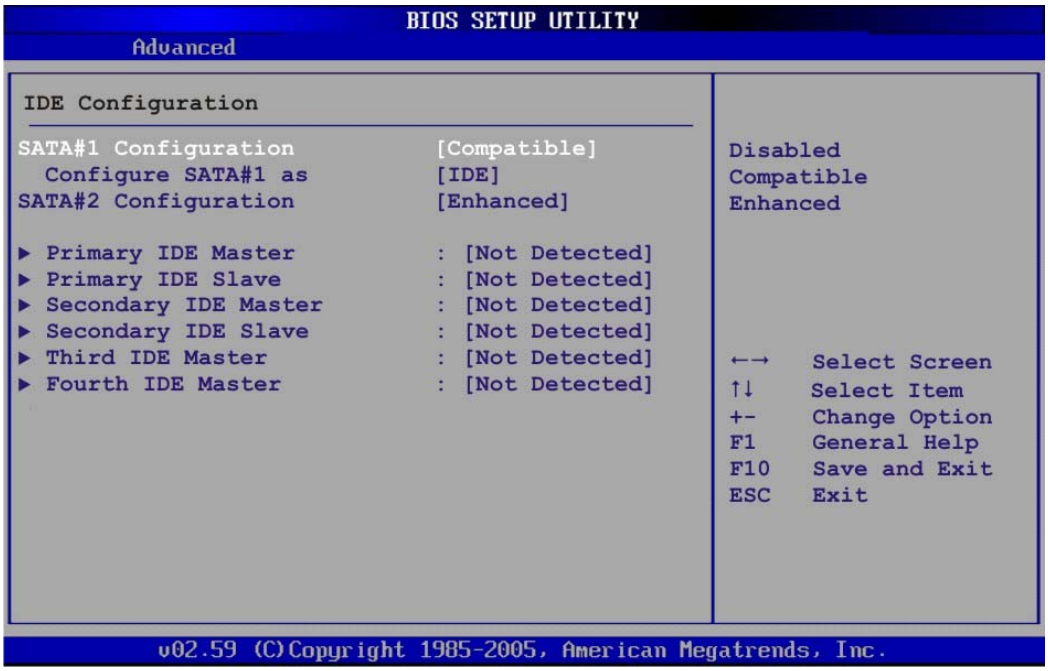
BIOS Menu 3: CPU Configuration

The CPU Configuration menu (**BIOS Menu 3**) lists the following CPU details:

- **Manufacturer**: Lists the name of the CPU manufacturer
- **Brand String**: Lists the brand name of the CPU being used
- **Frequency:** Lists the CPU processing speed
- **FSB Speed**: Lists the FSB speed
- **Cache L1**: Lists the CPU L1 cache size
- **Cache L2**: Lists the CPU L2 cache size

6.3.2 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 4**) to change and/or set the configuration of the IDE devices installed in the system.



BIOS Menu 4: IDE Configuration

➔ **SATA#1 Configurations [Compatible]**

Use the **SATA#1 Configurations** option to configure the SATA controller.

➔ **Disabled** Disables the on-board SATA controller.

➔ **Compatible** **DEFAULT** Configures the on-board SATA controller to be in compatible mode. In this mode, a SATA channel will replace one of the IDE channels. This mode supports up to 4 storage devices.

➔ **Enhanced** Configures the on-board SATA controller to be in Enhanced mode. In this mode, IDE channels and SATA channels are separated. This mode supports up to 6 storage devices. Some legacy OS do not support this mode.

➔ **Configure SATA as [IDE]**

Use the **Configure SATA as** option to configure SATA devices as normal IDE devices.

➔ **IDE** **DEFAULT** Configures SATA devices as normal IDE device.

➔ **AHCI** Configures SATA devices as AHCI.

➔ **SATA#2 Configurations [Compatible]**

Use the **SATA#2 Configurations** option to configure the SATA controller.

➔ **Disabled** Disables the on-board SATA controller.

➔ **Enhanced** Configures the on-board SATA controller to be in Enhanced mode. In this mode, IDE channels and SATA channels are separated. This mode supports up to 6 storage devices. Some legacy OS do not support this mode.

➔ **IDE Master and IDE Slave**

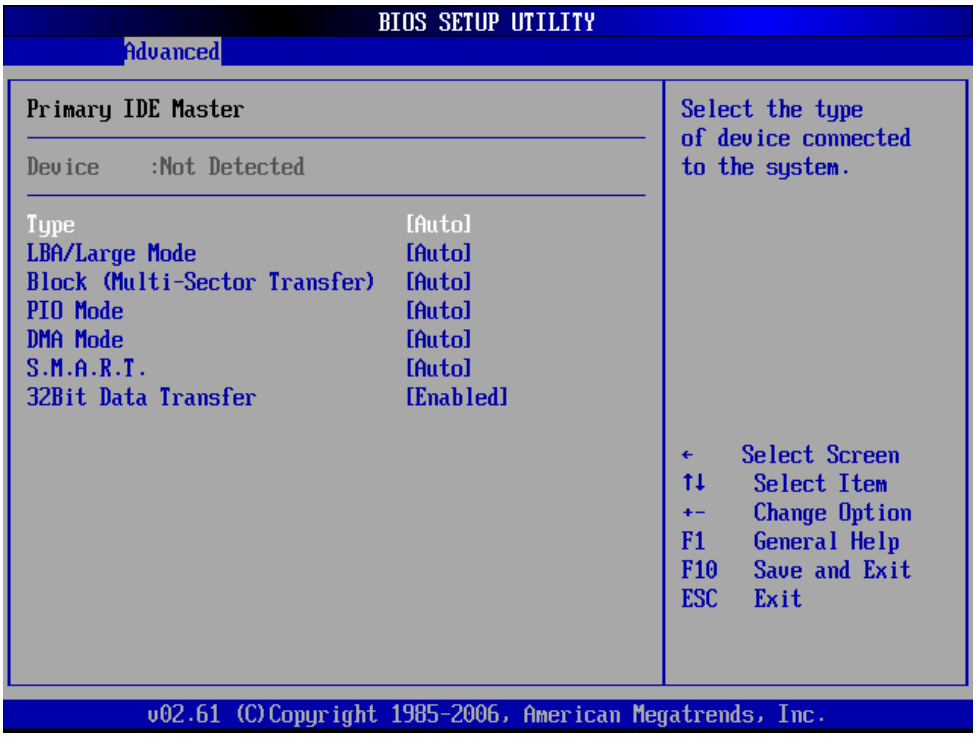
When entering setup, BIOS auto detects the presence of IDE devices. BIOS displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

- Primary IDE Master
- Primary IDE Slave
- Secondary IDE Master
- Secondary IDE Slave
- Third IDE Master
- Fourth IDE Master

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 6.3.2.1** appear.

6.3.2.1 IDE Master, IDE Slave

Use the **IDE Master** and **IDE Slave** configuration menu to view both primary and secondary IDE device details and configure the IDE devices connected to the system.



BIOS Menu 5: IDE Master and IDE Slave Configuration

➔ **Auto-Detected Drive Parameters**

The “grayed-out” items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

- **Device**: Lists the device type (e.g. hard disk, CD-ROM etc.)
- **Type**: Indicates the type of devices a user can manually select
- **Vendor**: Lists the device manufacturer
- **Size**: List the storage capacity of the device.
- **LBA Mode**: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.

- **Block Mode**: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.
- **PIO Mode**: Indicates the PIO mode of the installed device.
- **Async DMA**: Indicates the highest Asynchronous DMA Mode that is supported.
- **Ultra DMA**: Indicates the highest Synchronous DMA Mode that is supported.
- **S.M.A.R.T.**: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.
- **32Bit Data Transfer**: Enables 32-bit data transfer.

➔ **Type [Auto]**

Use the **Type** BIOS option select the type of device the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) is complete.

➔ **Not Installed** BIOS is prevented from searching for an IDE disk drive on the specified channel.

➔ **Auto** **DEFAULT** The BIOS auto detects the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel.

➔ **CD/DVD** The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS does not attempt to search for other types of IDE disk drives on the specified channel.

➔ **ARMD** This option specifies an ATAPI Removable Media Device. These include, but are not limited to:

➔ **ZIP**

➔ **LS-120**

➔ **LBA/Large Mode [Auto]**

Use the **LBA/Large Mode** option to disable or enable BIOS to auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

➔ **Disabled**		BIOS is prevented from using the LBA mode control on the specified channel.
➔ **Auto**	**DEFAULT**	BIOS auto detects the LBA mode control on the specified channel.

➔ **Block (Multi Sector Transfer) [Auto]**

Use the **Block (Multi Sector Transfer)** to disable or enable BIOS to auto detect if the device supports multi-sector transfers.

➔ **Disabled**		BIOS is prevented from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time.
➔ **Auto**	**DEFAULT**	BIOS auto detects Multi-Sector Transfer support on the drive on the specified channel. If supported the data transfer to and from the device occurs multiple sectors at a time.

➔ **PIO Mode [Auto]**

Use the **PIO Mode** option to select the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

- ➔ **Auto** **DEFAULT** BIOS auto detects the PIO mode. Use this value if the IDE disk drive support cannot be determined.
- ➔ **0** PIO mode 0 selected with a maximum transfer rate of 3.3MBps
- ➔ **1** PIO mode 1 selected with a maximum transfer rate of 5.2MBps
- ➔ **2** PIO mode 2 selected with a maximum transfer rate of 8.3MBps
- ➔ **3** PIO mode 3 selected with a maximum transfer rate of 11.1MBps
- ➔ **4** PIO mode 4 selected with a maximum transfer rate of 16.6MBps (This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.)

➔ **DMA Mode [Auto]**

Use the **DMA Mode** BIOS selection to adjust the DMA mode options.

- ➔ **Auto** **DEFAULT** BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined.
- ➔ **SWDMA0** Single Word DMA mode 0 selected with a maximum data transfer rate of 2.1MBps
- ➔ **SWDMA1** Single Word DMA mode 1 selected with a maximum data transfer rate of 4.2MBps
- ➔ **SWDMA2** Single Word DMA mode 2 selected with a maximum data transfer rate of 8.3MBps
- ➔ **MWDMA0** Multi Word DMA mode 0 selected with a maximum data transfer rate of 4.2MBps
- ➔ **MWDMA1** Multi Word DMA mode 1 selected with a maximum data transfer rate of 13.3MBps

- ➔ **MWDMA2** Multi Word DMA mode 2 selected with a maximum data transfer rate of 16.6MBps
- ➔ **UDMA1** Ultra DMA mode 0 selected with a maximum data transfer rate of 16.6MBps
- ➔ **UDMA1** Ultra DMA mode 1 selected with a maximum data transfer rate of 25MBps
- ➔ **UDMA2** Ultra DMA mode 2 selected with a maximum data transfer rate of 33.3MBps
- ➔ **UDMA3** Ultra DMA mode 3 selected with a maximum data transfer rate of 44MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- ➔ **UDMA4** Ultra DMA mode 4 selected with a maximum data transfer rate of 66.6MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- ➔ **UDMA5** Ultra DMA mode 5 selected with a maximum data transfer rate of 99.9MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)

➔ **S.M.A.R.T [Auto]**

Use the **S.M.A.R.T** option to auto-detect, disable or enable Self-Monitoring Analysis and Reporting Technology (SMART) on the drive on the specified channel. **S.M.A.R.T** predicts impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

- ➔ **Auto** **DEFAULT** BIOS auto detects HDD SMART support.
- ➔ **Disabled** Prevents BIOS from using the HDD SMART feature.
- ➔ **Enabled** Allows BIOS to use the HDD SMART feature

➔ **32Bit Data Transfer [Enabled]**

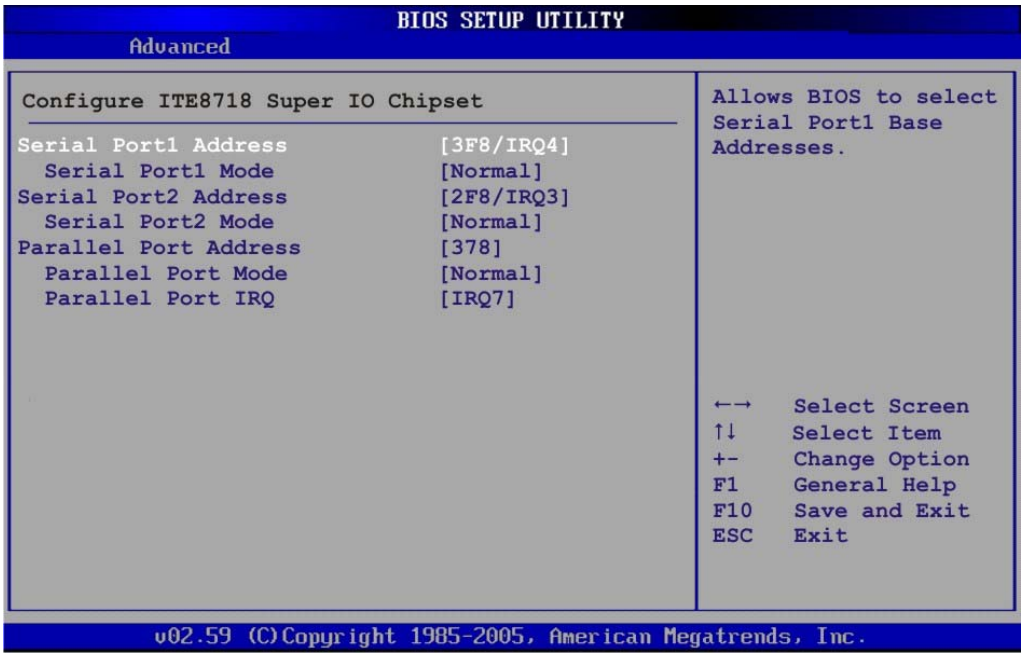
Use the **32Bit Data Transfer** BIOS option to enables or disable 32-bit data transfers.

➔ **Disabled** Prevents the BIOS from using 32-bit data transfers.

➔ **Enabled** **DEFAULT** Allows BIOS to use 32-bit data transfers on supported hard disk drives.

6.3.3 Super IO Configuration

Use the **Super IO Configuration** menu (**BIOS Menu 6**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



BIOS Menu 6: Super IO Configuration

➔ **Serial Port1 Address [3F8/IRQ4]**

Use the **Serial Port1 Address** option to select the Serial Port 1 base address.

➔ **Disabled** No base address is assigned to Serial Port 1

- **3F8/IRQ4** **DEFAULT** Serial Port 1 I/O port address is 3F8 and the interrupt address is IRQ4
- **3E8/IRQ4** Serial Port 1 I/O port address is 3E8 and the interrupt address is IRQ4
- **2E8/IRQ3** Serial Port 1 I/O port address is 2E8 and the interrupt address is IRQ3

➔ **Serial Port1 Mode [Normal]**

Use the **Serial Port1 Mode** option to select the transmitting and receiving mode for the first serial port.

- **Normal** **DEFAULT** Serial Port 1 mode is normal
- **IrDA** Serial Port 1 mode is IrDA
- **ASK IR** Serial Port 1 mode is ASK IR

➔ **Serial Port2 Address [2F8/IRQ3]**

Use the **Serial Port2 Address** option to select the Serial Port 2 base address.

- **Disabled** No base address is assigned to Serial Port 2
- **2F8/IRQ3** **DEFAULT** Serial Port 2 I/O port address is 3F8 and the interrupt address is IRQ3
- **3E8/IRQ4** Serial Port 2 I/O port address is 3E8 and the interrupt address is IRQ4
- **2E8/IRQ3** Serial Port 2 I/O port address is 2E8 and the interrupt address is IRQ3

➔ **Serial Port2 Mode [Normal]**

Use the **Serial Port2 Mode** option to select the Serial Port2 operational mode.

- ➔ **Normal** **DEFAULT** Serial Port 2 mode is normal
- ➔ **IrDA** Serial Port 2 mode is IrDA
- ➔ **ASK IR** Serial Port 2 mode is ASK IR

➔ **Parallel Port Address [378]**

Use the **Parallel Port Address** option to select the parallel port base address.

- ➔ **Disabled** No base address is assigned to the Parallel Port
- ➔ **378** **DEFAULT** Parallel Port I/O port address is 378
- ➔ **278** Parallel Port I/O port address is 278
- ➔ **3BC** Parallel Port I/O port address is 3BC

➔ **Parallel Port Mode [Normal]**

Use the **Parallel Port Mode** option to select the mode the parallel port operates in.

- ➔ **Normal** **DEFAULT** The normal parallel port mode is the standard mode for parallel port operation.
- ➔ **EPP** The parallel port operates in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode.
- ➔ **ECP+EPP** The parallel port operates in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the

transmission rates between the two are much faster than the Normal mode

The parallel port is also be compatible with EPP devices described above

➔ **Parallel Port IRQ [IRQ7]**

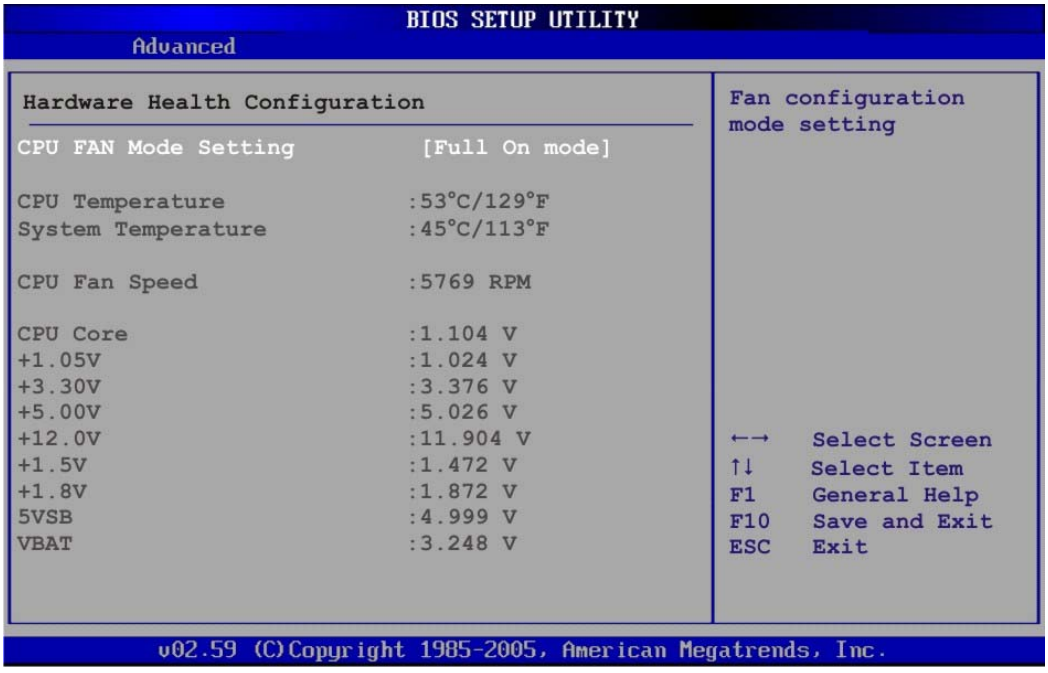
Use the **Parallel Port IRQ** selection to set the parallel port interrupt address.

➔ **IRQ5** IRQ5 is assigned as the parallel port interrupt address

➔ **IRQ7** **DEFAULT** IRQ7 is assigned as the parallel port interrupt address

6.3.4 Hardware Health Configuration

The **Hardware Health Configuration** menu (**BIOS Menu 7**) shows the operating temperature, fan speeds and system voltages.



BIOS Menu 7: Hardware Health Configuration

➔ **CPU FAN Mode Setting [Full On Mode]**

Use the **CPU FAN Mode Setting** option to configure the second fan.

➔ **Full On Mode**	**DEFAULT**	Fan is on all the time
➔ **Automatic mode**		Fan is off when the temperature is low enough. Parameters must be set by the user.
➔ **PWM Manual mode**		Pulse width modulation set manually

When the **CPU FAN Mode Setting** option is in the **Automatic Mode**, the following parameters can be set.

- CPU Temp. Limit of OFF
- CPU Temp. Limit of On
- CPU Fan Start PWM
- Slope PWM

When the **CPU FAN Mode Setting** option is in the **PWM Manual Mode**, the following parameters can be set.

- CPU Fan PWM control

➔ **CPU Temp. Limit of OFF [000]**

WARNING:

Setting this value too high may cause the fan to stop when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of OFF** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of OFF** option to select the CPU temperature at which the cooling fan should automatically turn off. To select a value,

select the **CPU Temp. Limit of OFF** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Temp. Limit of On [020]**

WARNING:

Setting this value too high may cause the fan to start only when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of On** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of On** option to select the CPU temperature at which the cooling fan should automatically turn on. When the fan starts, it rotates using the starting pulse width modulation (PWM) specified in the **Fan 3 Start PWM** option below. To select a value, select the **CPU Temp. Limit of On** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Fan Start PWM [070]**

The **Fan 3 Start PWM** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Fan 3 Start PWM** option to select the PWM mode the fan starts to rotate with after the temperature specified in the **Temperature 3 Limit of Start** is exceeded. The Super I/O chipset supports 128 PWM modes. To select a value, select the **Fan 3 Start PWM** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- PWM Minimum Mode: 0

- PWM Maximum Mode: 127

➔ **Slope PWM [0.5 PWM]**

The **Slope PWM 1** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Slope PWM 1** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. A list of available options is shown below:

- 0.125 PWM
- 0.25 PWM
- 0.5 PWM
- 1 PWM
- 2 PWM
- 4 PWM
- 8 PWM
- 15 PWM

The following system parameters and values are shown. The system parameters that are monitored are:

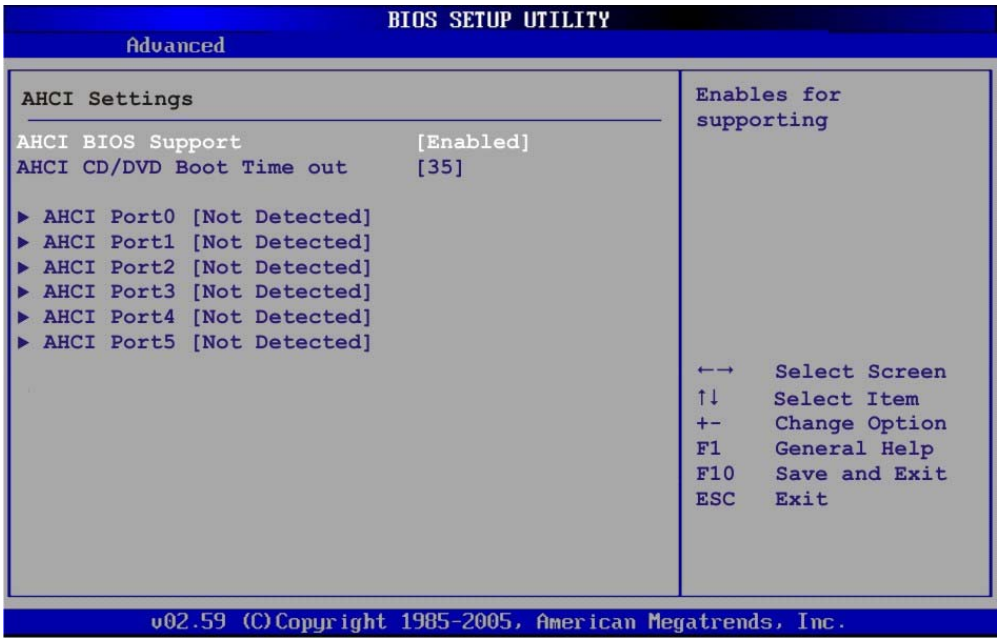
- **System Temperatures**: The following system temperatures are monitored
  - CPU Temperature
  - System Temperature
- **Fan Speeds**: The CPU cooling fan speed is monitored.
  - CPU Fan Speed
- **Voltages**: The following system voltages are monitored
  - CPU Core
  - +1.05V
  - +3.30V
  - +5.00V
  - +12.0 V
  - +1.5V
  - +1.8V
  - 5VSB
  - VBAT

6.3.5 AHCI Configuration

NOTE:

Advanced Host Controller Interface (AHCI) is a new programming interface for SATA host controllers. AHCI systems do not have master/slave designation for SATA devices, each device is treated as a master, and hardware-assisted native command queuing.

Use the **AHCI Settings** menu (**BIOS Menu 8**) to report on the auto-detection of devices connected to the onboard SATA drive connectors.



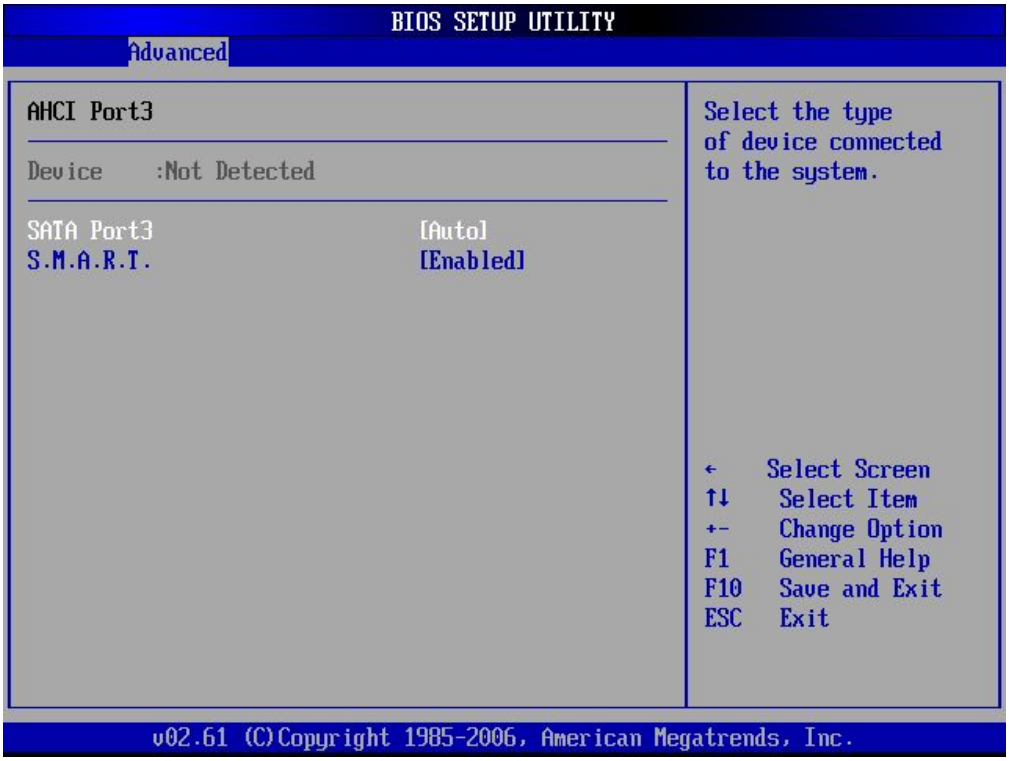
BIOS Menu 8: AHCI Configuration

➔ **AHCI Port n [Not Detected]**

Use the **AHCI Port n** BIOS option to check what AHCI (Advanced Host Controller Interface) devices are detected to a specified SATA drive connector. If a device is detected, selecting the BIOS option, e.g. "**AHCI Port 3**" opens a new window.

6.3.5.1 AHCI Port n

Use the **AHCI Port n** configuration menu (**BIOS Menu 9**) to configure the drive connected to SATA connector n.



BIOS Menu 9: AHCI Port n Configuration Menu

➔ **SATA Port n [Auto]**

Use the **SATA Port n** option to enable the system to auto-detect the type of drive connected to SATA drive connector n.

➔ **S.M.A.R.T [Enabled]**

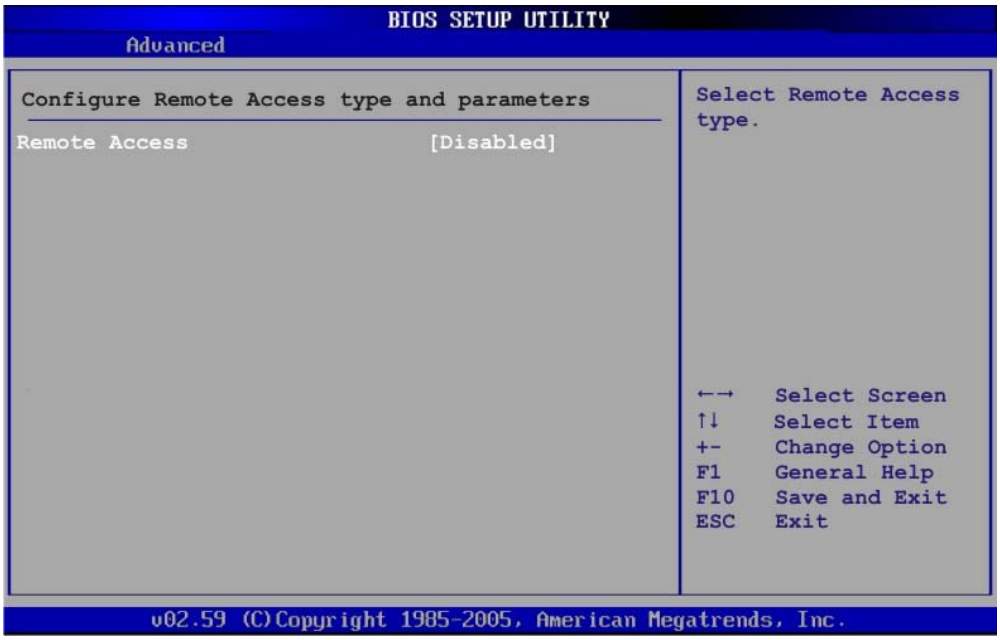
Use the **S.M.A.R.T** option to enable S.M.A.R.T (Self-Monitoring, Analysis, and Reporting Technology) on the drive connected to SATA drive connector n.

➔ **Enabled** **DEFAULT** S.M.A.R.T is enabled on the drive connected to SATA drive connector n on the system

➔ **Disabled** S.M.A.R.T is disabled on the drive connected to SATA drive connector n on the system

6.3.6 Remote Configuration

Use the **Remote Access Configuration** menu (**BIOS Menu 10**) to configure remote access parameters. The **Remote Access Configuration** is an AMIBIOS feature and allows a remote host running a terminal program to display and configure the BIOS settings.



BIOS Menu 10: Remote Access Configuration [Advanced]

➔ **Remote Access [Disabled]**

Use the **Remote Access** option to enable or disable access to the remote functionalities of the system.

➔ **Disabled** **DEFAULT** Remote access is disabled.

➔ **Enabled** Remote access configuration options shown below

appear:

- ➔ **Serial Port Number**
- ➔ **Serial Port Mode**
- ➔ **Redirection after BIOS POST**
- ➔ **Terminal Type**

These configuration options are discussed below.

➔ **Serial Port Number [COM1]**

Use the **Serial Port Number** option allows to select the serial port used for remote access.

- ➔ **COM1** **DEFAULT** System is remotely accessed through COM1
- ➔ **COM2** System is remotely accessed through COM2

NOTE: Make sure the selected COM port is enabled through the Super I/O configuration menu.

➔ **Base Address, IRQ [3F8h,4]**

The **Base Address, IRQ** option cannot be configured and only shows the interrupt address of the serial port listed above.

➔ **Serial Port Mode [115200 8,n,1]**

Use the **Serial Port Mode** option to select baud rate through which the console redirection is made. The following configuration options are available

- 115200 8,n,1 **DEFAULT**
- 57600 8,n,1
- 38400 8,n,1

- 19200 8,n,1
- 09600 8,n,1

NOTE:

Identical baud rate setting musts be set on the host (a management computer running a terminal software) and the slave

➔ **Redirection After BIOS POST [Always]**

Use the **Redirection After BIOS POST** option to specify when console redirection should occur.

➔ **Disabled**		The console is not redirected after POST
➔ **Boot Loader**		Redirection is active during POST and during Boot Loader
➔ **Always**	**DEFAULT**	Redirection is always active (Some OSes may not work if set to Always)

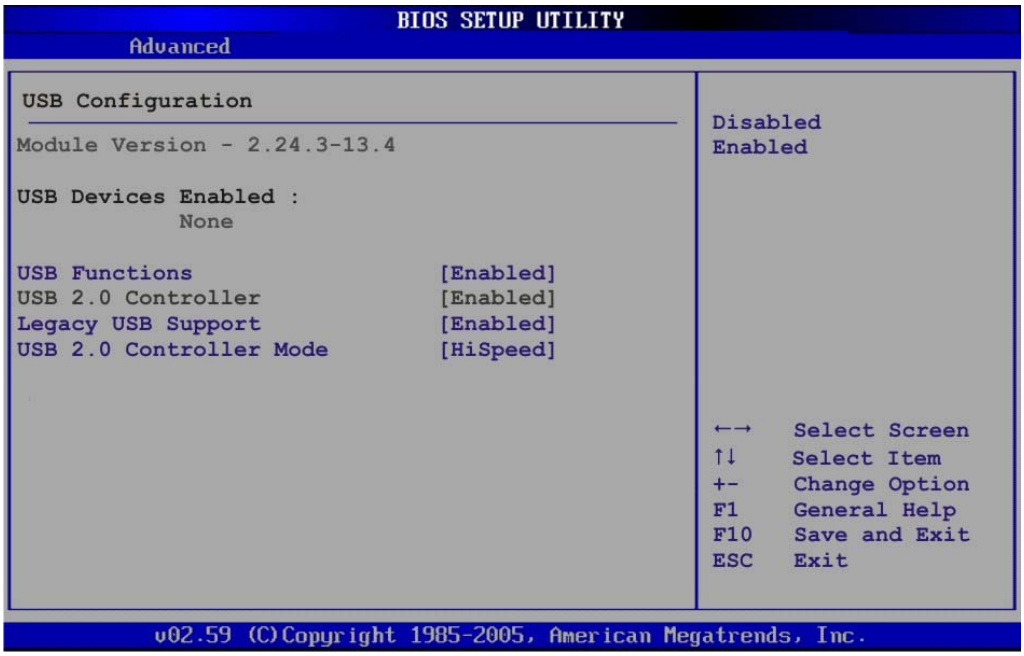
➔ **Terminal Type [ANSI]**

Use the **Terminal Type** BIOS option to specify the remote terminal type.

➔ **ANSI**	**DEFAULT**	The target terminal type is ANSI
➔ **VT100**		The target terminal type is VT100
➔ **VT-UTF8**		The target terminal type is VT-UTF8

6.3.7 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 11**) to read USB configuration information and configure the USB settings.



BIOS Menu 11: USB Configuration

➔ **USB Functions [Enabled]**

Use the **USB Function** option to enable or disable the USB controllers.

➔ **Disabled** USB controllers are enabled

➔ **Enabled** **DEFAULT** USB controllers are disabled

➔ **USB 2.0 Controller [Enabled]**

The **USB 2.0 Controller** BIOS option is enabled.

➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

➔ **Disabled**		Legacy USB support disabled
➔ **Enabled**	**DEFAULT**	Legacy USB support enabled
➔ **Auto**		Legacy USB support disabled if no USB devices are connected

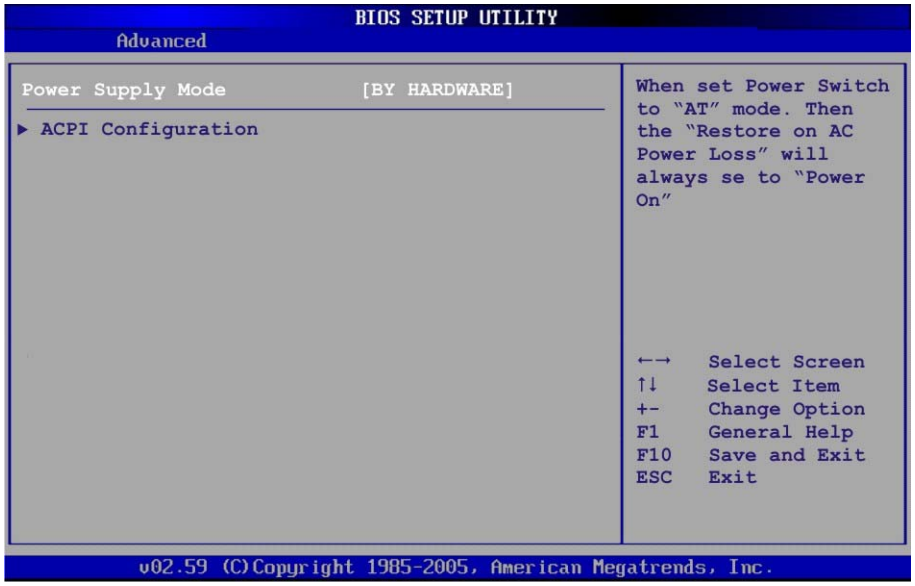
➔ **USB2.0 Controller Mode [HiSpeed]**

The **USB2.0 Controller Mode** BIOS option sets the speed of the USB2.0 controller.

➔ **FullSpeed**		The controller is capable of operating at full speed 12 Mb/s
➔ **HiSpeed**	**DEFAULT**	The controller is capable of operating at high speed 480 Mb/s

6.3.8 Power Configuration

The **Power Configuration** menu (**BIOS Menu 12**) configures the Advanced Configuration and Power Interface (ACPI) options.


BIOS SETUP UTILITY
Advanced
Power Supply Mode [BY HARDWARE]
▶ ACPI Configuration
When set Power Switch to "AT" mode. Then the "Restore on AC Power Loss" will always se to "Power On"
←→ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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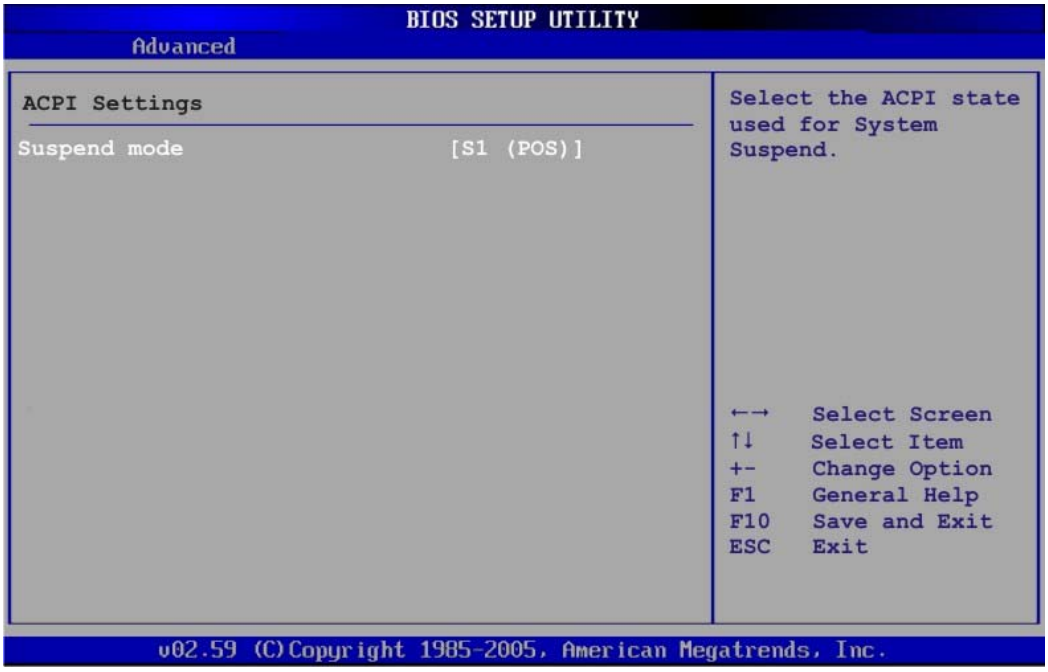
BIOS Menu 12: Power Configuration

6.3.8.1 ACPI configuration

The **ACPI Configuration** menu (**BIOS Menu 13**) configures the Advanced Configuration and Power Interface (ACPI).



BIOS Menu 13: ACPI Configuration

➔ **Suspend Mode [S1(POS)]**

Use the **Suspend Mode** BIOS option to specify the sleep state the system enters when it is not being used.

➔ **S1 (POS)** **DEFAULT** System appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

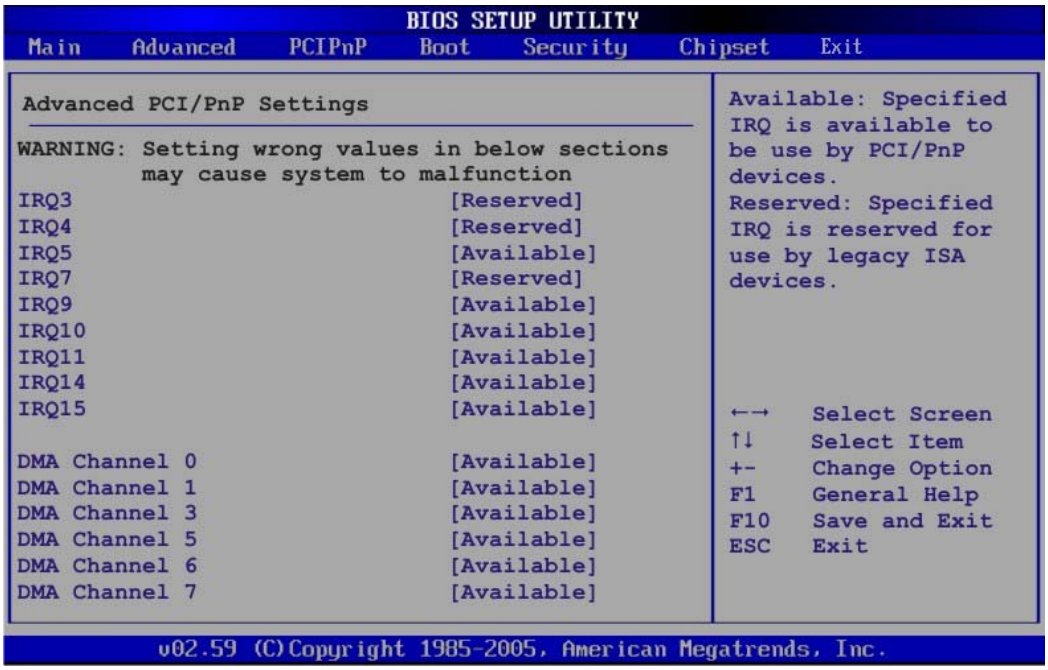
➔ **S3 (STR)** System appears off. The CPU has no power; RAM is in slow refresh; the power supply is in a reduced power mode.

6.4 PCI/PnP

Use the PCI/PnP menu (**BIOS Menu 14**) to configure advanced PCI and PnP settings.

WARNING:

Setting wrong values for the BIOS selections in the PCIPnP BIOS menu may cause the system to malfunction.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Advanced PCI/PnP Settings
WARNING: Setting wrong values in below sections may cause system to malfunction
IRQ3 [Reserved]
IRQ4 [Reserved]
IRQ5 [Available]
IRQ7 [Reserved]
IRQ9 [Available]
IRQ10 [Available]
IRQ11 [Available]
IRQ14 [Available]
IRQ15 [Available]
DMA Channel 0 [Available]
DMA Channel 1 [Available]
DMA Channel 3 [Available]
DMA Channel 5 [Available]
DMA Channel 6 [Available]
DMA Channel 7 [Available]
Available: Specified IRQ is available to be use by PCI/PnP devices.
Reserved: Specified IRQ is reserved for use by legacy ISA devices.
←→ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 14: PCI/PnP Configuration

➔ **IRQ# [Available]**

Use the **IRQ#** address to specify what IRQs can be assigned to a particular peripheral device.

➔ **Available** **DEFAULT** The specified IRQ is available to be used by PCI/PnP devices

➔ **Reserved** The specified IRQ is reserved for use by Legacy ISA devices

Available IRQ addresses are:

- IRQ3
- IRQ4
- IRQ5
- IRQ7
- IRQ9
- IRQ10
- IRQ 11
- IRQ 14
- IRQ 15

➔ **DMA Channel# [Available]**

Use the **DMA Channel#** option to assign a specific DMA channel to a particular PCI/PnP device.

➔ **Available** **DEFAULT** The specified DMA is available to be used by PCI/PnP devices

➔ **Reserved** The specified DMA is reserved for use by Legacy ISA devices

Available DMA Channels are:

- DM Channel 0
- DM Channel 1
- DM Channel 3
- DM Channel 5
- DM Channel 6
- DM Channel 7
-

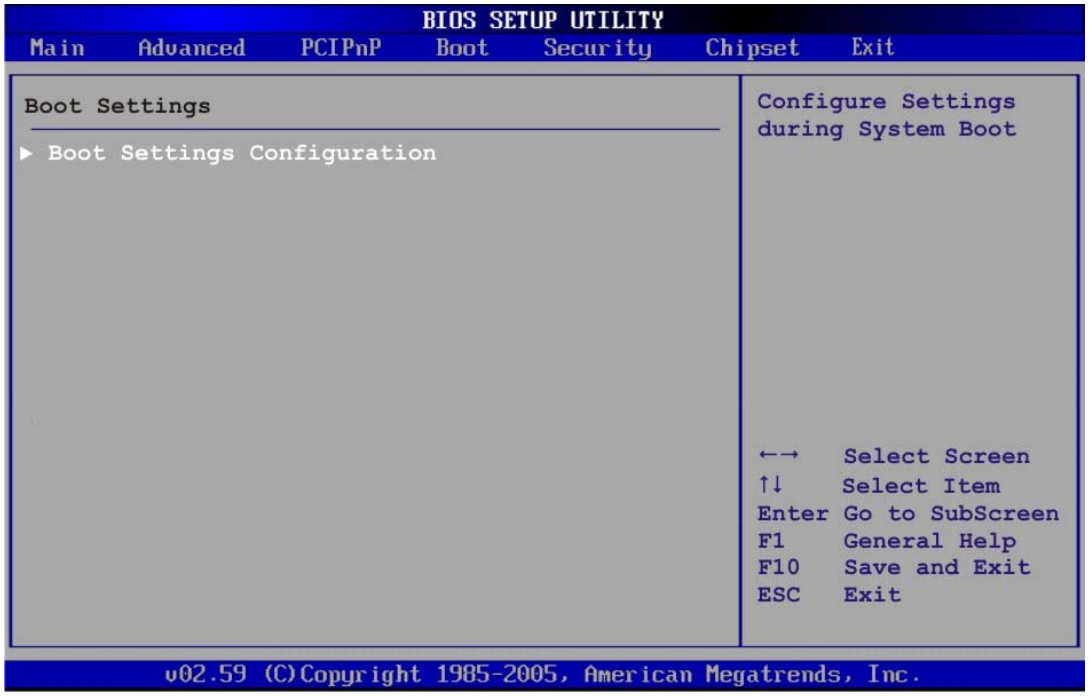
➔ **Reserved Memory Size [Disabled]**

Use the **Reserved Memory Size** BIOS option to specify the amount of memory that should be reserved for legacy ISA devices.

➔	**Disabled**	**DEFAULT**	No memory block reserved for legacy ISA devices
➔	**16K**		16KB reserved for legacy ISA devices
➔	**32K**		32KB reserved for legacy ISA devices
➔	**64K**		64KB reserved for legacy ISA devices

6.5 Boot

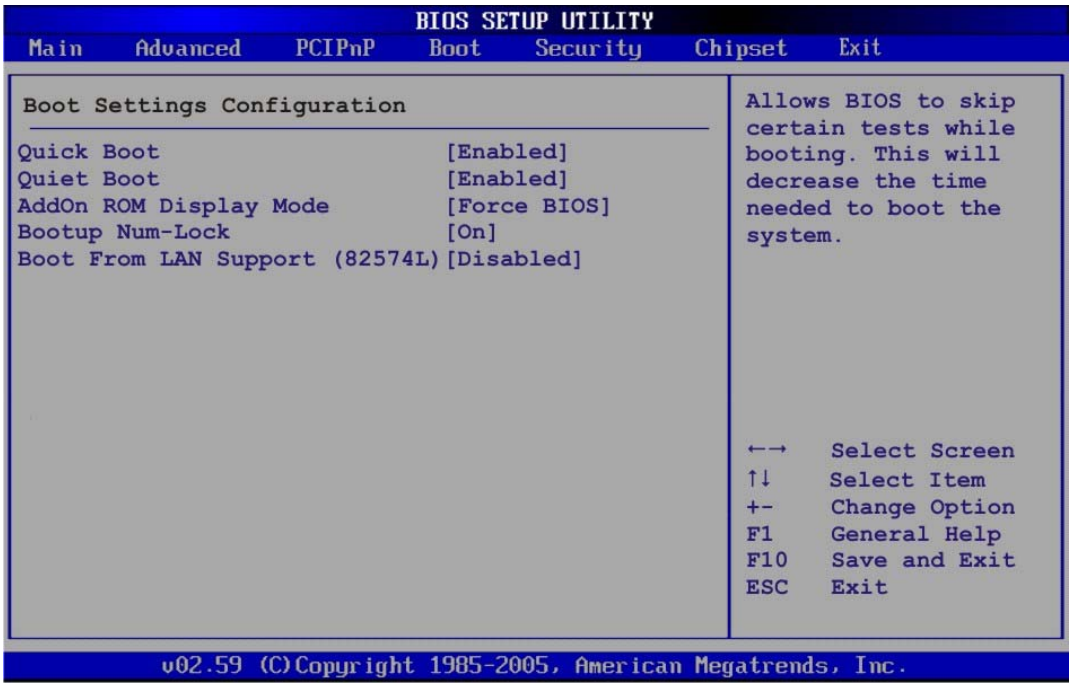
Use the Boot menu (**BIOS Menu 15**) to configure system boot options.



BIOS Menu 15: Boot

6.5.1 Boot Settings Configuration

Use the Boot Settings Configuration menu to configure advanced system boot options.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Boot Settings Configuration
Quick Boot [Enabled]
Quiet Boot [Enabled]
AddOn ROM Display Mode [Force BIOS]
Bootup Num-Lock [On]
Boot From LAN Support (82574L) [Disabled]
Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
←→ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 16: Boot Settings Configuration

➔ **Quick Boot [Enabled]**

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

➔ **Disabled**		No POST procedures are skipped
➔ **Enabled**	**DEFAULT**	Some POST procedures are skipped to decrease the system boot time

➔ **Quiet Boot [Disabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled**	**DEFAULT**	Normal POST messages displayed

➔ **Enabled** OEM Logo displayed instead of POST messages

➔ **AddOn ROM Display Mode [Force BIOS]**

The **AddOn ROM Display Mode** option allows add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS** **DEFAULT** Allows the computer system to force a third party BIOS to display during system boot.

➔ **Keep Current** Allows the computer system to display the information during system boot.

➔ **Bootup Num-Lock [On]**

The **Bootup Num-Lock** BIOS option allows the Number Lock setting to be modified during boot up.

➔ **Off** Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **On** **DEFAULT** Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

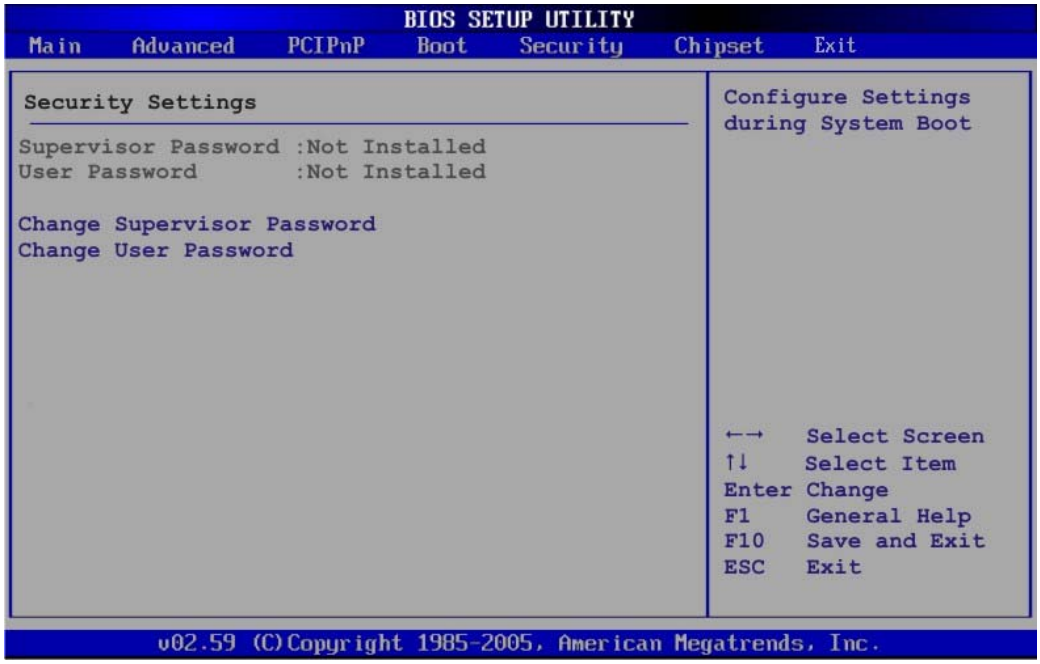
➔ **Boot From LAN Support [Disabled]**

The **BOOT From LAN Support** option enables the system to be booted from a remote system.

➔ **Enabled**		Can be booted from a remote system through the LAN
➔ **Disabled**	**DEFAULT**	Cannot be booted from a remote system through the LAN

6.6 Security

Use the Security menu (**BIOS Menu 17**) to set system and user passwords.



BIOS Menu 17: Security

➔ **Change Supervisor Password**

Use the **Change Supervisor Password** to set or change a supervisor password. The default for this option is **Not Installed**. If a supervisor password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change Supervisor Password**.

➔ **Change User Password**

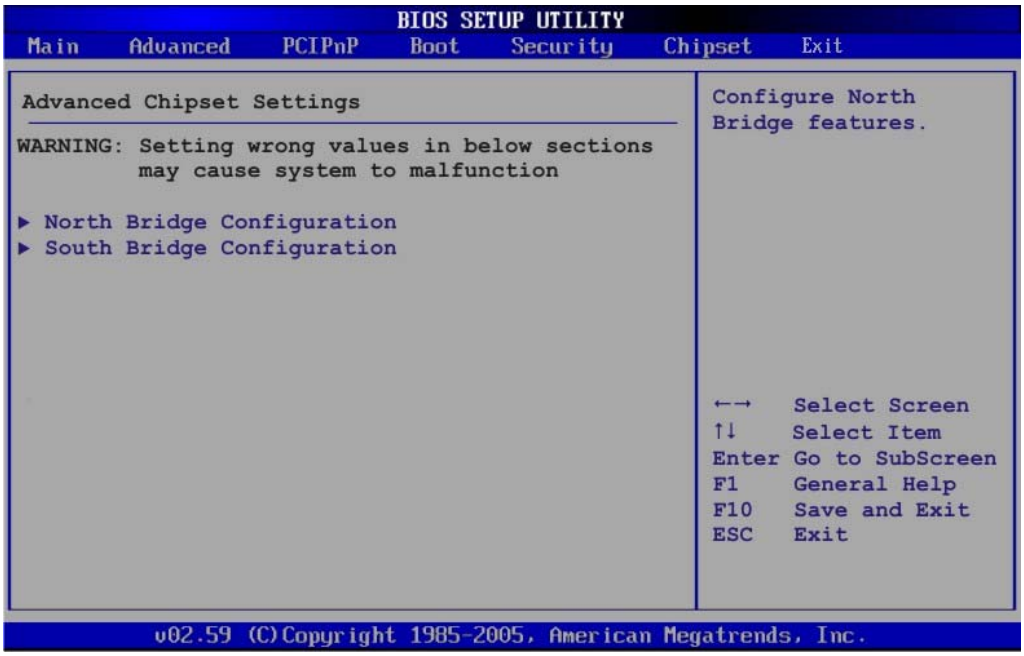
Use the **Change User Password** to set or change a user password. The default for this option is **Not Installed**. If a user password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change User Password**.

6.7 Chipset

Use the **Chipset** menu (**BIOS Menu 18**) to access the NorthBridge and SouthBridge configuration menus

WARNING!

Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Advanced Chipset Settings
WARNING: Setting wrong values in below sections may cause system to malfunction
▶ North Bridge Configuration
▶ South Bridge Configuration
Configure North Bridge features.
←→ Select Screen
↑↓ Select Item
Enter Go to SubScreen
F1 General Help
F10 Save and Exit
ESC Exit
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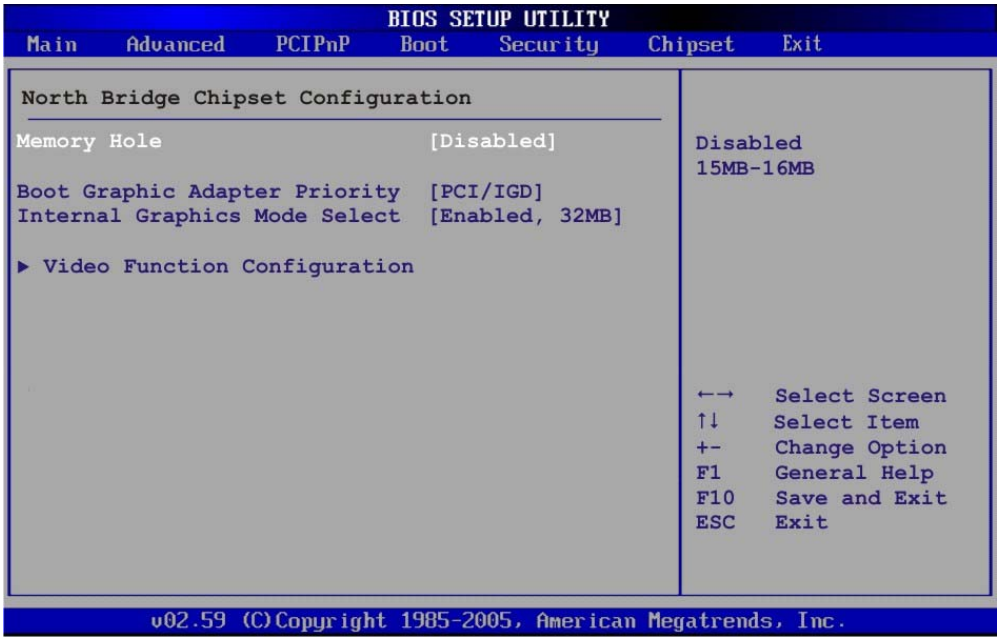
BIOS Menu 18: Chipset

6.7.1 North Bridge Chipset Configuration

Use the **North Bridge Chipset Configuration** menu (**BIOS Menu 19**) to configure the Northbridge chipset settings.



BIOS Menu 19:North Bridge Chipset Configuration

➔ **Memory Hole [Disabled]**

Use the **Memory Hole** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

➔ **Disabled**	**DEFAULT**	Memory is not reserved for ISA expansion cards
➔ **15MB – 16MB**		Between 15MB and 16MB of memory is reserved for ISA expansion cards

➔ **Boots Graphics Adapter Priority [PCI/IGD]**

Use the **Boots Graphics Adapter** option to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a combination of PCI graphics controller, a PCI express (PEG) controller or an IGD. Configuration options are listed below:

- IGD
- PCI/IGD **DEFAULT**

➔ **Internal Graphics Mode Select [Enable, 32MB]**

The **Internal Graphic Mode Select** option determines the amount of system memory that can be used by the Internal graphics device.

➔ **Disable**		
➔ **Enable, 32MB**		32MB of memory used by internal graphics device
➔ **Enable, 64MB**	**DEFAULT**	64MB of memory used by internal graphics device
➔ **Enable, 128MB**		128MB of memory used by internal graphics device

6.7.1.1 Video Function Configuration

Use the **Video Function Configuration** menu to configure the video device connected to the system.

➔ **Boot Display Device [Auto]**

Use the **Boot Display Device** option to select the display device used by the system when it boots. Configuration options are listed below.

- Auto **DEFAULT**
- CRT
- TV
- LVDS

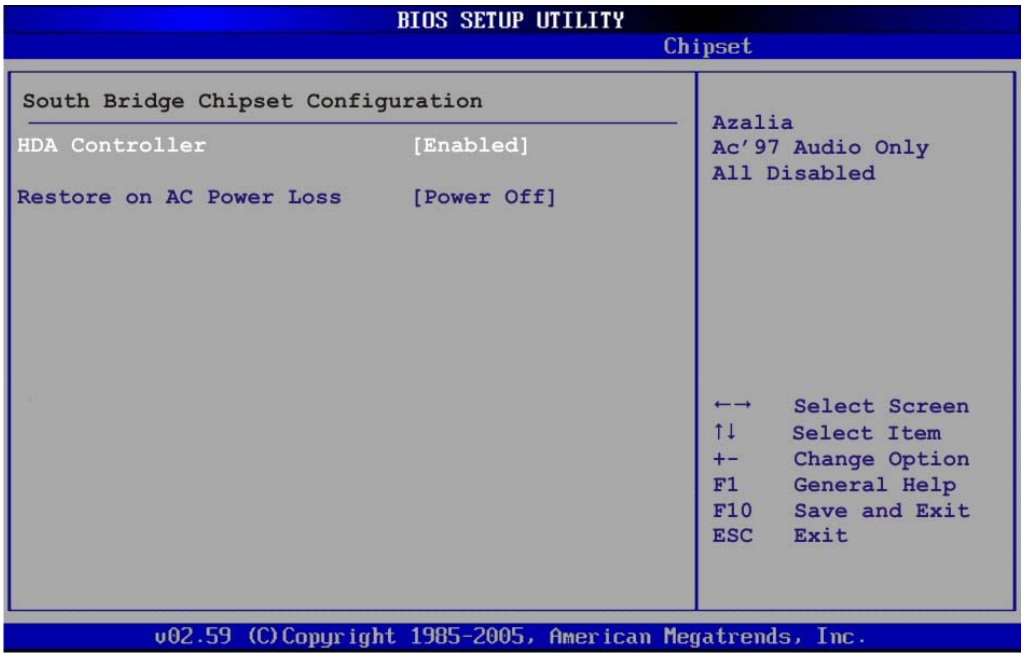
➔ **Flat Panel Type [BY HARDWARE]**

Use the **Flat Panel Type** option to select the type of flat panel connected to the system. Configuration options are listed below.

- 640x480 18b
- 800x600 18b
- 1024x768 18b
- 1024x768 24b
- 1280x1024 48b
- 1600x1200 48b
- BY HARDWARE

6.7.2 SouthBridge Configuration

The **SouthBridge Configuration** menu (**BIOS Menu 20**) the southbridge chipset to be configured.



BIOS Menu 20:SouthBridge Chipset Configuration

➔ **HDA Controller [Enabled]**

The **HDA Controller** option enables or disables the audio controller.

➔ **Enabled**	**DEFAULT**	The on-board High Definition audio controller is enabled.
➔ **Disabled**		The on-board audio controller is disabled.

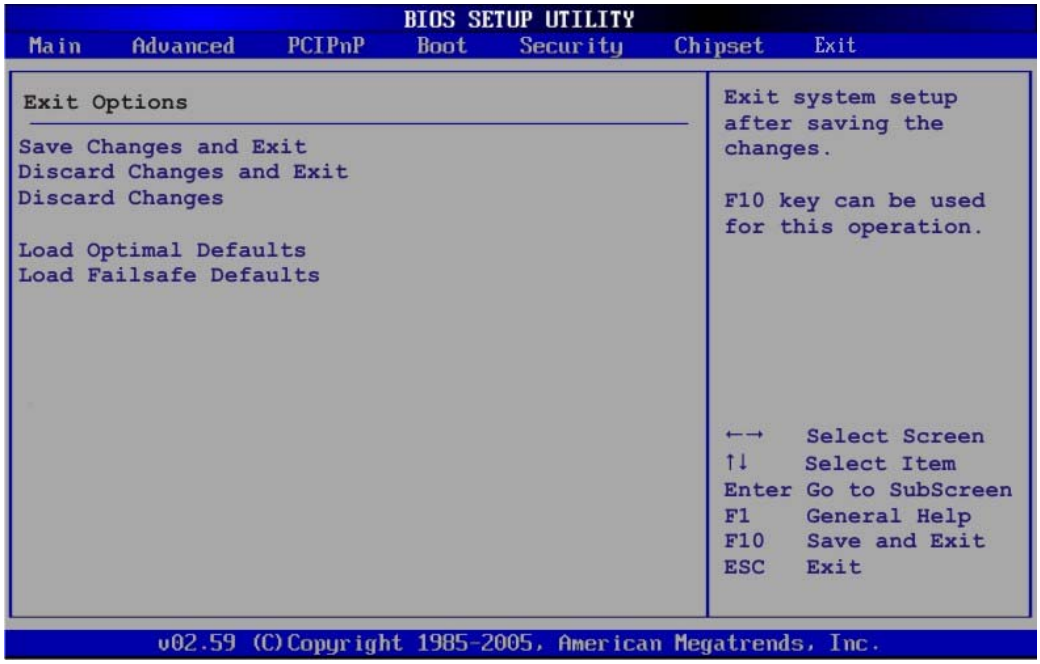
➔ **Restore on AC Power Loss [Power Off]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

➔ **Power Off**	**DEFAULT**	The system remains turned off
➔ **Power On**		The system turns on
➔ **Last State**		The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

6.8 Exit

Use the **Exit** menu (**BIOS Menu 21**) to load default BIOS values, optimal failsafe values and to save configuration changes.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Load Failsafe Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
←→ Select Screen
↑↓ Select Item
Enter Go to SubScreen
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 21:Exit

➔ **Save Changes and Exit**

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

➔ **Discard Changes and Exit**

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

➔ **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

➔ **Load Optimal Defaults**

Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

➔ **Load Failsafe Defaults**

Use the **Load Failsafe Defaults** option to load failsafe default values for each of the parameters on the Setup menus. **F8 key can be used for this operation.**

Chapter

7

Software Drivers

7.1 Available Software Drivers

NOTE:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

The following drivers can be installed on the system:

- Chipset
- VGA
- LAN
- Audio

Installation instructions are given below.

7.2 Starting the Driver Program

To access the driver installation programs, please do the following.

Step 1: Insert the CD-ROM that came with the system into a CD-ROM drive attached to the system.

Step 2: The screen in **Figure 7-1** appears.

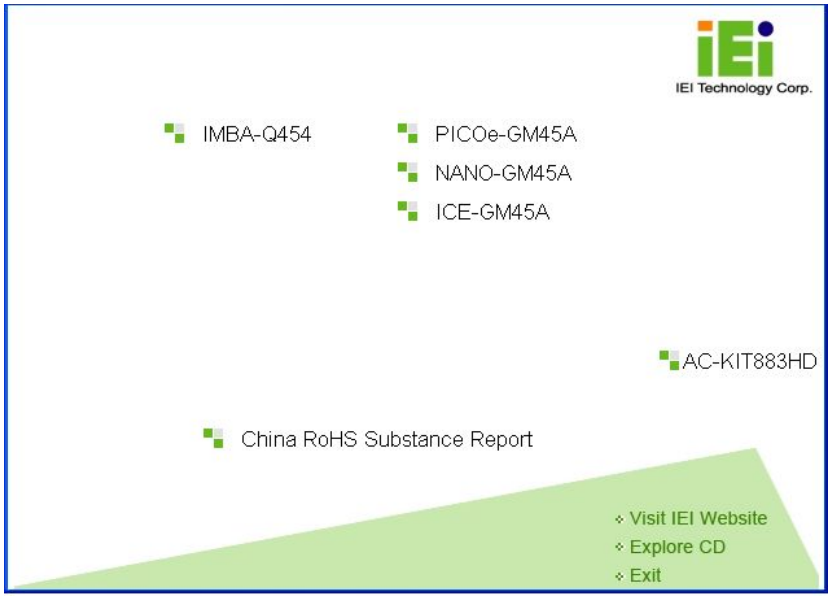

Figure 7-1: Start Up Screen

Step 3: Click **PICOe-GM45A**.

Step 4: The list of drivers in **Figure 7-2** appears.

Figure 7-2: Drivers

7.3 Chipset Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list shown in **Figure 7-2**. (See **Section 7.2**)

Step 2: Click "**1-NF**" and double click the **infinst_auto1.exe** setup file.

Step 3: The setup files are extracted as shown in **Figure 7-3**.

Figure 7-3: Chipset Driver Screen

Step 4: When the setup files are completely extracted the **Welcome Screen** in **Figure 7-4** appears.

Intel® Chipset Device Software
Intel® Chipset Device Software
intel
Welcome to the Setup Program
This setup program will install the Intel® Chipset Device Software onto this computer. It is strongly recommended that you exit all programs before continuing.
< Back
Next >
Cancel
Intel® Installation Framework

Figure 7-4: Chipset Driver Welcome Screen

Step 5: Click **Next** to continue.

Step 6: The license agreement in **Figure 7-5** appears.

Step 7: Read the **License Agreement**.

Step 8: Click the **Yes** icon to continue.

Intel® Chipset Device Software
Intel® Chipset Device Software
License Agreement
intel
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
< Back
Yes
No
Intel® Installation Framework

Figure 7-5: Chipset Driver License Agreement

Step 9: The Read Me file in **Figure 7-6** appears.

Step 10: Click **Next** to continue.

Intel® Chipset Device Software
Intel® Chipset Device Software
Readme File Information
intel
Refer to the Readme file below to view the system requirements and installation information.
Press the Page Down key to view the rest of the file.
****
* Product: Intel(R) Chipset Device Software
* Release: Production Version
* Version: 9.0.0.1008
* Target Chipset#: Intel(R) 4 Series Chipset
* Date: May 01 2008
****
< Back
Next >
Cancel
Intel® Installation Framework

Figure 7-6: Chipset Driver Read Me File

Step 11: **Setup Operations** are performed as shown in **Figure 7-7**.

Intel® Chipset Device Software
Intel® Chipset Device Software
Setup Progress
Please wait while the following setup operations are performed:
Installing Driver: Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
Version: 8.2.0.1008
Installing Driver: Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
Version: 8.2.0.1008
Installing Driver: Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
Version: 8.2.0.1008
Installing Driver: Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
Version: 8.2.0.1008
Click Next to continue.
Next
Intel® Installation Framework

Figure 7-7: Chipset Driver Setup Operations

Step 12: Once the **Setup Operations** are complete, click the **Next** icon to continue.

Step 13: The **Finish** screen appears.

Step 14: Select "**Yes, I want to restart the computer now**" and click the **Finish** icon.

See **Figure 7-8**.

Intel® Chipset Device Software
Intel® Chipset Device Software
Setup Is Complete
intel
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart this computer now.
No, I will restart this computer later.
Click Finish, then remove any installation media from the drives.
Finish
Intel® Installation Framework

Figure 7-8: Chipset Driver Installation Finish Screen

7.4 VGA Driver Installation

To install the VGA driver, please do the following.

Step 1: Access the driver list shown in **Figure 7-2**. (See **Section 7.2**)

Step 2: Click "**2-VGA**" and choose a proper folder base on the system. Double click the xxx.exe setup file.

Step 3: The VGA Read Me file in **Figure 7-9** appears.

Step 4: Click **Next** to continue.

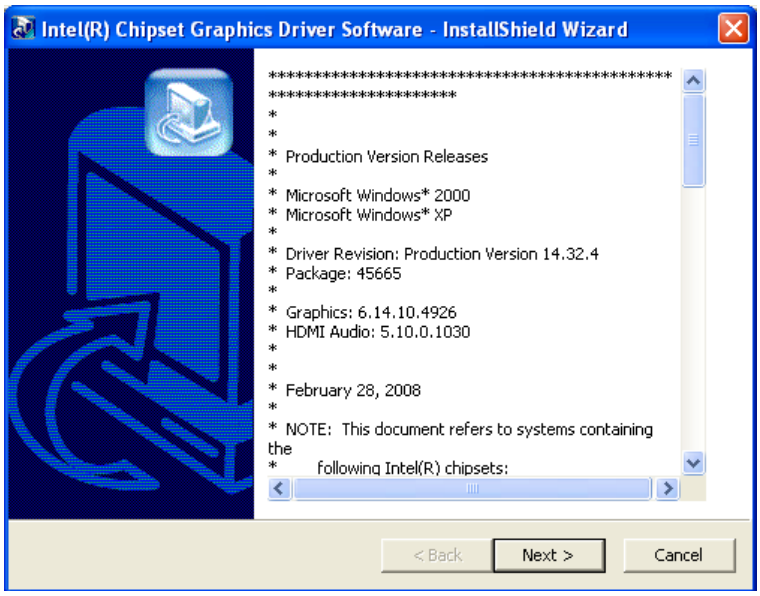
Intel(R) Chipset Graphics Driver Software - InstallShield Wizard
****
* Production Version Releases
* Microsoft Windows* 2000
* Microsoft Windows* XP
* Driver Revision: Production Version 14.32.4
* Package: 45665
* Graphics: 6.14.10.4926
* HDMI Audio: 5.10.0.1030
* February 28, 2008
* NOTE: This document refers to systems containing the
* following Intel(R) chipsets:
< Back
Next >
Cancel

Figure 7-9: VGA Driver Read Me File

Step 5: The installation files are extracted. See **Figure 7-10**.

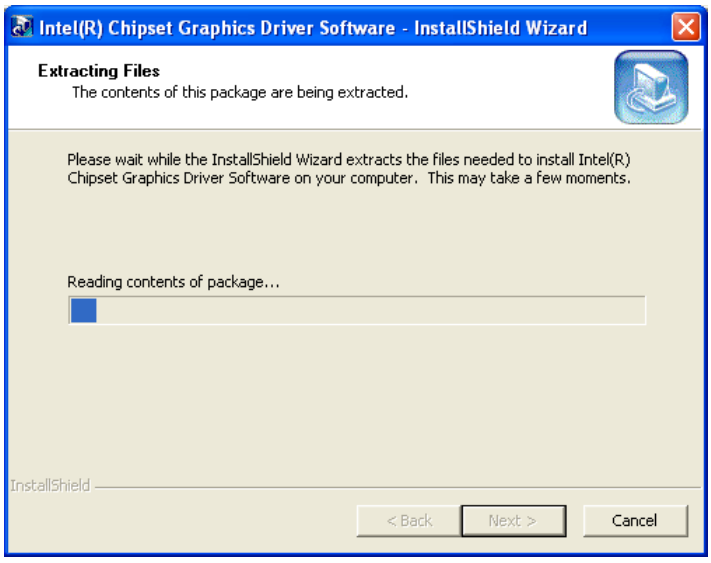
Intel(R) Chipset Graphics Driver Software - InstallShield Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield Wizard extracts the files needed to install Intel(R) Chipset Graphics Driver Software on your computer. This may take a few moments.
Reading contents of package...
InstallShield
< Back
Next >
Cancel

Figure 7-10: VGA Driver Setup Files Extracted

Step 6: The **Welcome Screen** in **Figure 7-11** appears.

Intel® Graphics Media Accelerator Driver
Intel® Graphics Media Accelerator Driver
Welcome to the Setup Program
This setup program will install the Intel® Graphics Media Accelerator Driver onto this computer. It is strongly recommended that you exit all programs before continuing. Click Next to continue.
< Back
Next >
Cancel
Intel® Installation Framework

Figure 7-11: VGA Driver Welcome Screen

Step 7: Click **Next** to continue.

Step 8: The license agreement in **Figure 7-12** appears.

Step 9: Read the **License Agreement**.

Step 10: Click the **Yes** icon to continue.

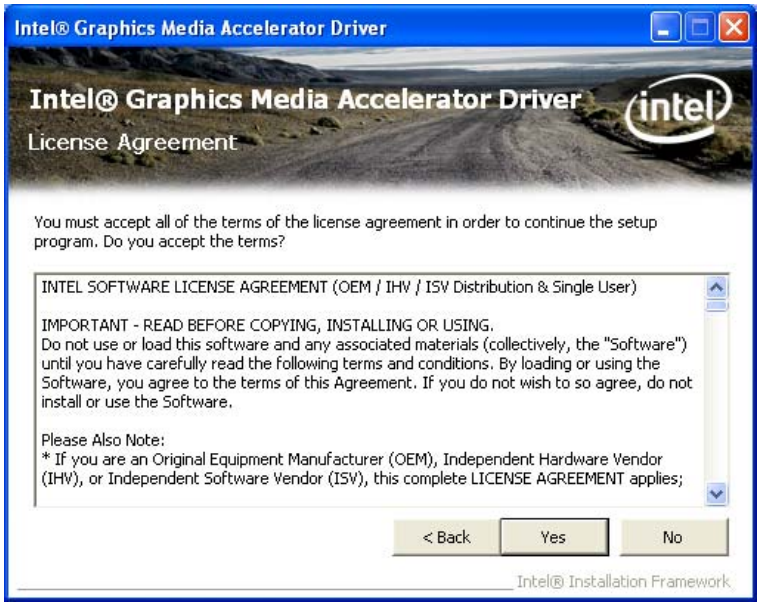
Intel® Graphics Media Accelerator Driver
Intel® Graphics Media Accelerator Driver
License Agreement
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
< Back
Yes
No
Intel® Installation Framework

Figure 7-12: VGA Driver License Agreement

Step 11: The Read Me file in **Figure 7-13** appears.

Step 12: Click **Next** to continue.

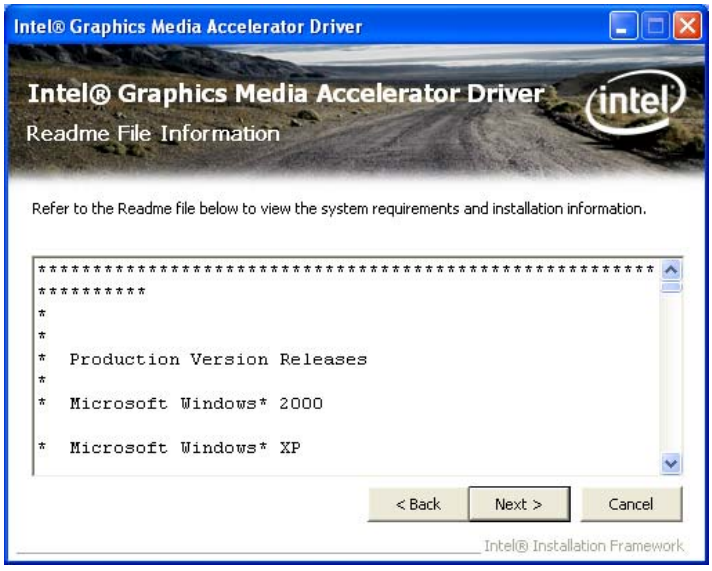

Figure 7-13: VGA Driver Read Me File

Step 13: **Setup Operations** are performed as shown in **Figure 7-14**.

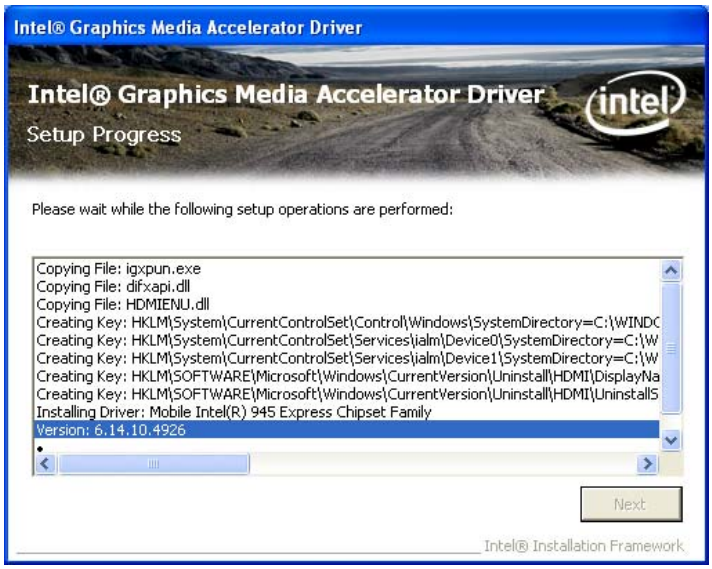

Figure 7-14: VGA Driver Setup Operations

Step 14: Once the **Setup Operations** are complete, click the **Next** icon to continue.

Step 15: The **Finish** screen appears.

Step 16: Select "**Yes, I want to restart the computer now**" and click the **Finish** icon.

See **Figure 7-15**.

Intel® Graphics Media Accelerator Driver
Intel® Graphics Media Accelerator Driver
Setup Is Complete
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart this computer now.
No, I will restart this computer later.
Click Finish, then remove any installation media from the drives.
Finish
Intel® Installation Framework

Figure 7-15: VGA Driver Installation Finish Screen

7.5 Intel® 82574 PCI Express Gigabit Ethernet Controller Driver

To install the Intel® 82574 PCIe GbE controller, please follow the steps below.

Step 1: Select "**3-LAN**" from the list in **Figure 7-2**.

Step 2: Locate the **PRO2KXP_v13_1_2.exe** setup file and double click it.

Step 3: The **License Agreement** for the Intel® 82573 appears. See **Figure 7-16**.

DriverInstaller - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
INTEL SOFTWARE LICENSE AGREEMENT
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
I accept the terms in the license agreement
I do not accept the terms in the license agreement
InstallShield
< Back
Next >
Cancel

Figure 7-16: Intel® 82574 License Agreement

Step 4: Accept the license terms and agreements in and click **NEXT** to continue.

Step 5: Next, select the directory in which the files must be saved. See **Figure 7-17**.

DriverInstaller - InstallShield Wizard
Location to Save Files
Where would you like to save your files?
Please enter the folder where you want these files saved. If the folder does not exist, it will be created for you. To continue, click Next.
Save files in folder:
c:\Intel11.1
Change...
InstallShield
< Back
Next >
Cancel

Figure 7-17: Intel® 82574 File Location Select

Step 6: Click **NEXT** to continue.

Step 7: The driver begins to extract the installation files. See **Figure 7-18**.

DriverInstaller - InstallShield Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield Wizard extracts the files needed to install DriverInstaller on your computer. This may take a few moments.
Extracting Autorun.exe...
InstallShield
< Back
Next >
Cancel

Figure 7-18: Intel® 82574 Installation Files Extraction

Step 8: The Intel® PRO Network Connections window appears. See **Figure 7-19**.

Figure 7-19: Intel® PRO Network Connections window

Step 9: Click **INSTALL DRIVERS** in **Figure 7-19**.

Step 10: The **Intel® PRO Network Connections Welcome** screen in **Figure 7-20** appears.

Intel(R) PRO Network Connections - InstallShield Wizard
Welcome to the InstallShield Wizard for
Intel(R) PRO Network Connections
Installs drivers, Intel(R) PROSet for Windows* Device Manager, and Advanced Networking Services.
WARNING: This program is protected by copyright law and international treaties.
InstallShield
< Back
Next >
Cancel

Figure 7-20: Intel® PRO Network Connections Welcome

Step 11: Click **NEXT** to continue.

Step 12: A new **License Agreement** appears. See **Figure 7-21**.

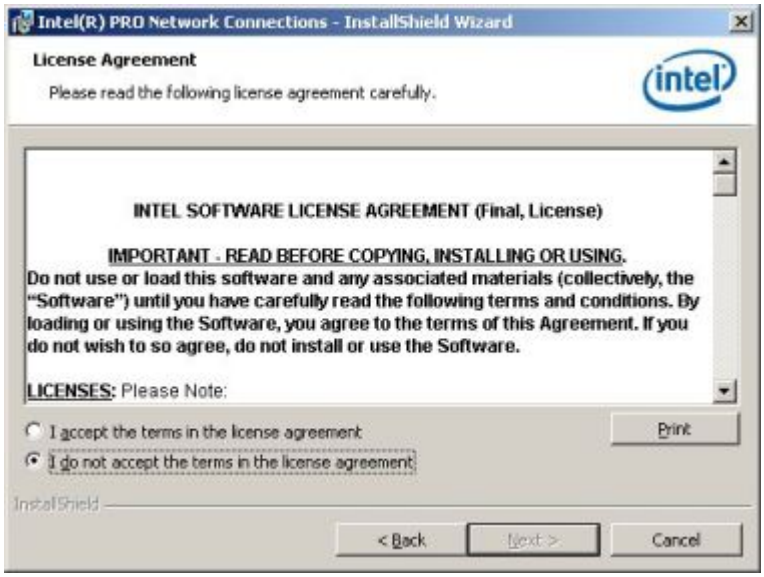
Intel(R) PRO Network Connections - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
INTEL SOFTWARE LICENSE AGREEMENT (Final, License)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
LICENSES: Please Note:
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

Figure 7-21: License Agreement

Step 13: Accept the terms and conditions in **Figure 7-21** and click **NEXT** to continue.

Step 14: The **Setup Type** window in **Figure 7-22** appears.

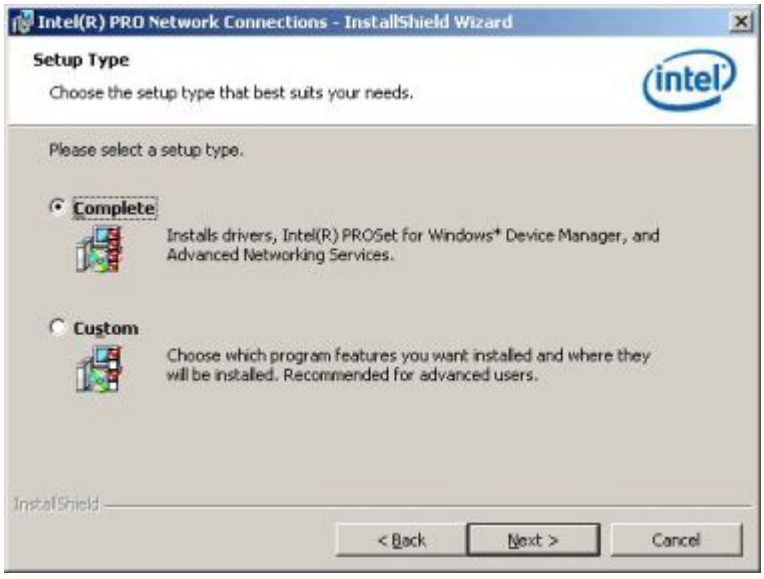
Intel(R) PRO Network Connections - InstallShield Wizard
Setup Type
Choose the setup type that best suits your needs.
Please select a setup type.
Complete
Installs drivers, Intel(R) PROSet for Windows* Device Manager, and Advanced Networking Services.
Custom
Choose which program features you want installed and where they will be installed. Recommended for advanced users.
InstallShield
< Back
Next >
Cancel

Figure 7-22: Setup Type

Step 15: Select the setup type in **Figure 7-22** and click **NEXT** to continue.

Step 16: The drivers are installed. See **Figure 7-23**.

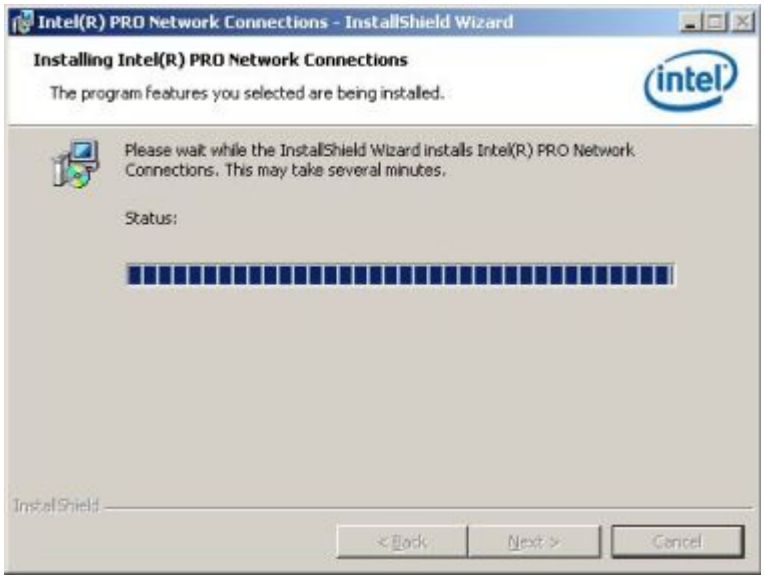
Intel(R) PRO Network Connections - InstallShield Wizard
Installing Intel(R) PRO Network Connections
The program features you selected are being installed.
intel
Please wait while the InstallShield Wizard installs Intel(R) PRO Network Connections. This may take several minutes.
Status:
InstallShield
< Back
Next >
Cancel

Figure 7-23: Intel® 82573 Driver Installation Progress

Step 17: When the driver is installed. Click **FINISH** in the termination screen.

7.6 Audio Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list shown in **Figure 7-2**. (See **Section 7.2**)

Step 2: Click "**4-Audio**". Select a proper OS folder and locate the xxx.exe setup file.

Step 3: Double click the setup file. Installation files are extracted as shown in **Figure 7-24**.

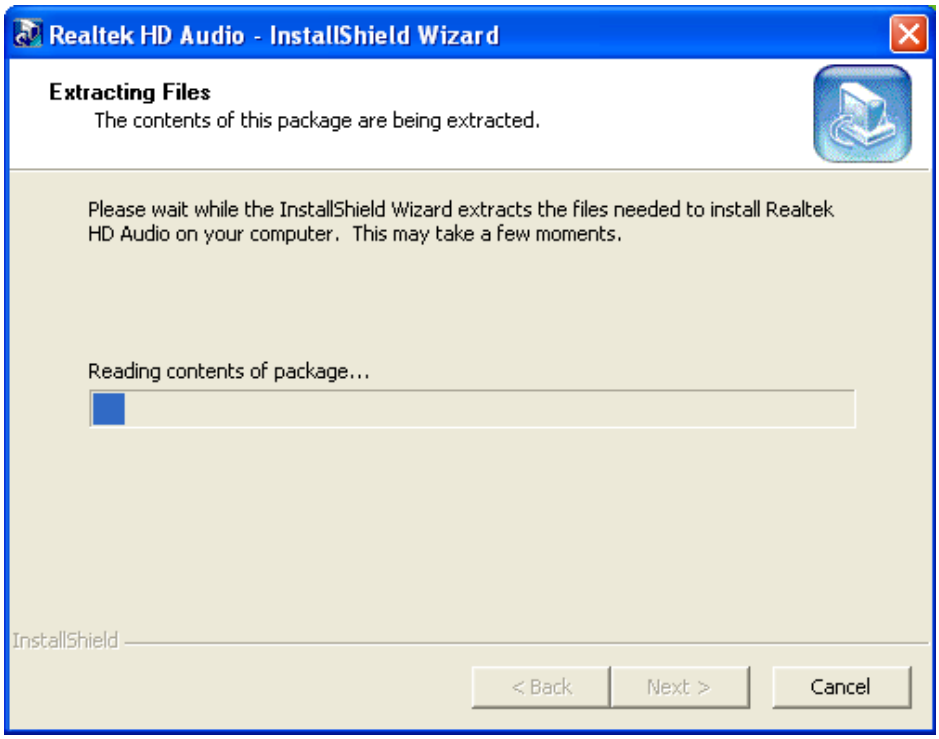
Realtek HD Audio - InstallShield Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield Wizard extracts the files needed to install Realtek HD Audio on your computer. This may take a few moments.
Reading contents of package...
InstallShield
< Back
Next >
Cancel

Figure 7-24: Extract HD Audio Driver Installation Files

Step 4: The **Welcome** screen in **Figure 7-25** appears.

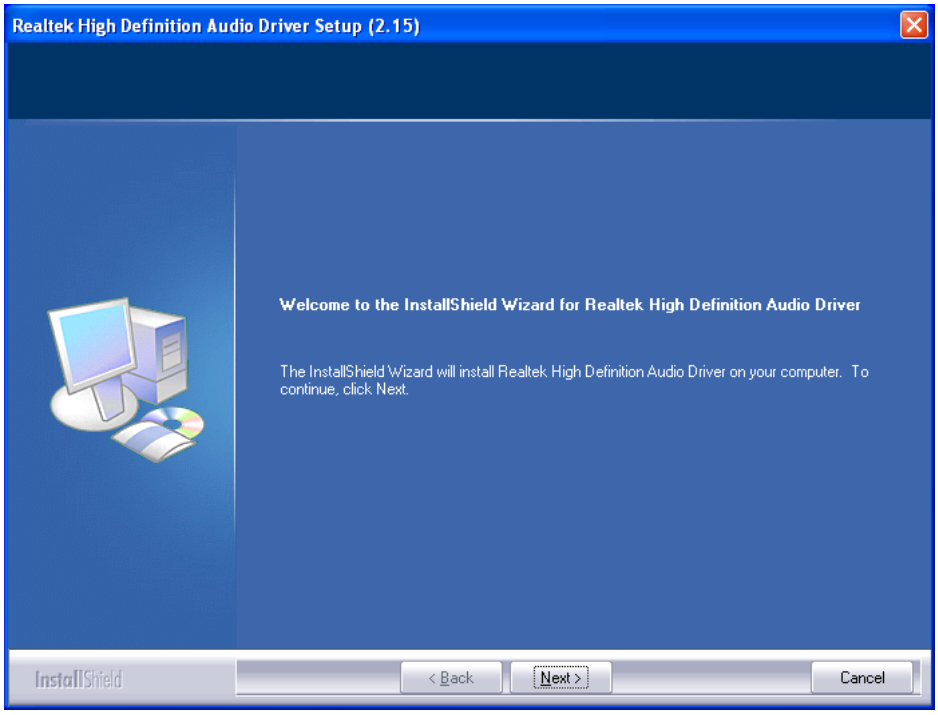
Realtek High Definition Audio Driver Setup (2.15)
Welcome to the InstallShield Wizard for Realtek High Definition Audio Driver
The InstallShield Wizard will install Realtek High Definition Audio Driver on your computer. To continue, click Next.
InstallShield
< Back
Next >
Cancel

Figure 7-25: HD Audio Driver Welcome Screen

Step 5: Click **Next** to continue.

Step 6: The system updates. See **Figure 7-26**.

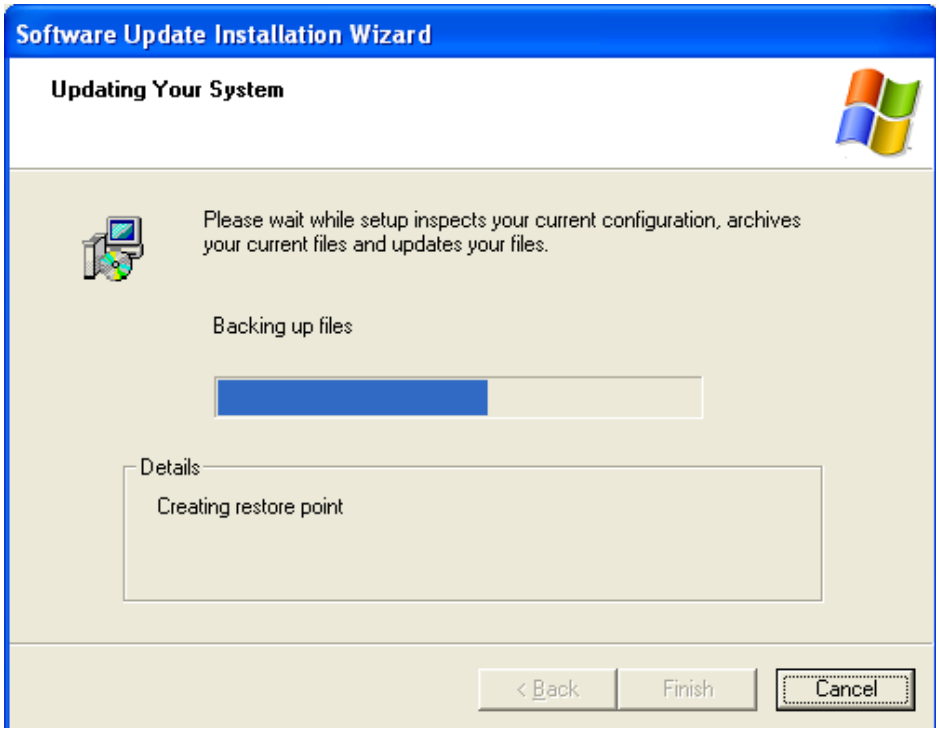

Figure 7-26: System Update

Step 7: Follow the installation instructions until the HD Audio driver installation is complete.

Step 1:

Appendix

A

BIOS Menu Options

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Appendix

B

Terminology

AC ’97	Audio Codec 97 (AC’97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude (“volume”) of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CMOS	Complimentary metal-oxide-conductor is a type of integrated circuit used in chips like static RAM and microprocessors.
COM	COM is used to refer to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal

	computer is usually a male DE-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.

MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
PCIe	PCI Express (PCIe) is a communications bus that uses dual data lines for full-duplex (two-way) serial (point-to-point) communications between the SBC components and/or expansion cards and the SBC chipsets. Each line has a 2.5 Gbps data transmission rate and a 250 MBps sustained data transfer rate.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAM	Random Access Memory (RAM) is a form of storage used in computer. RAM is volatile memory, so it loses its data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.

USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

DIO Interface

C.1 DIO Interface Introduction

The DIO connector on the PICOe-GM45A is interfaced to GPIO ports on the ITE IT8718F Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

NOTE:

For further information, please refer to the datasheet for the Winbond W83697HG Super I/O chipset.

C.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port.

Pin	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 3	GP23	General Purpose I/O Port 2 Bit 3
4	Output 2	GP22	General Purpose I/O Port 2 Bit 2
5	Output 1	GP21	General Purpose I/O Port 2 Bit 1
6	Output 0	GP20	General Purpose I/O Port 2 Bit 0
7	Input 3	GP33	General Purpose I/O 33
8	Input 2	GP32	General Purpose I/O 32
9	Input 1	GP31	General Purpose I/O 31
10	Input 0	GP30	General Purpose I/O 30

C.3 Assembly Language Samples

C.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

```
MOV     AX, 6F08H     Sets the digital port as input
INT     15H           Initiates the INT 15H BIOS call
```

C.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

```
MOV     AX, 6F09H     Sets the digital port as output
MOV     BL, 09H
INT     15H           Initiates the INT 15H BIOS call
```

Appendix

D

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table D-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. While the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

Example program:

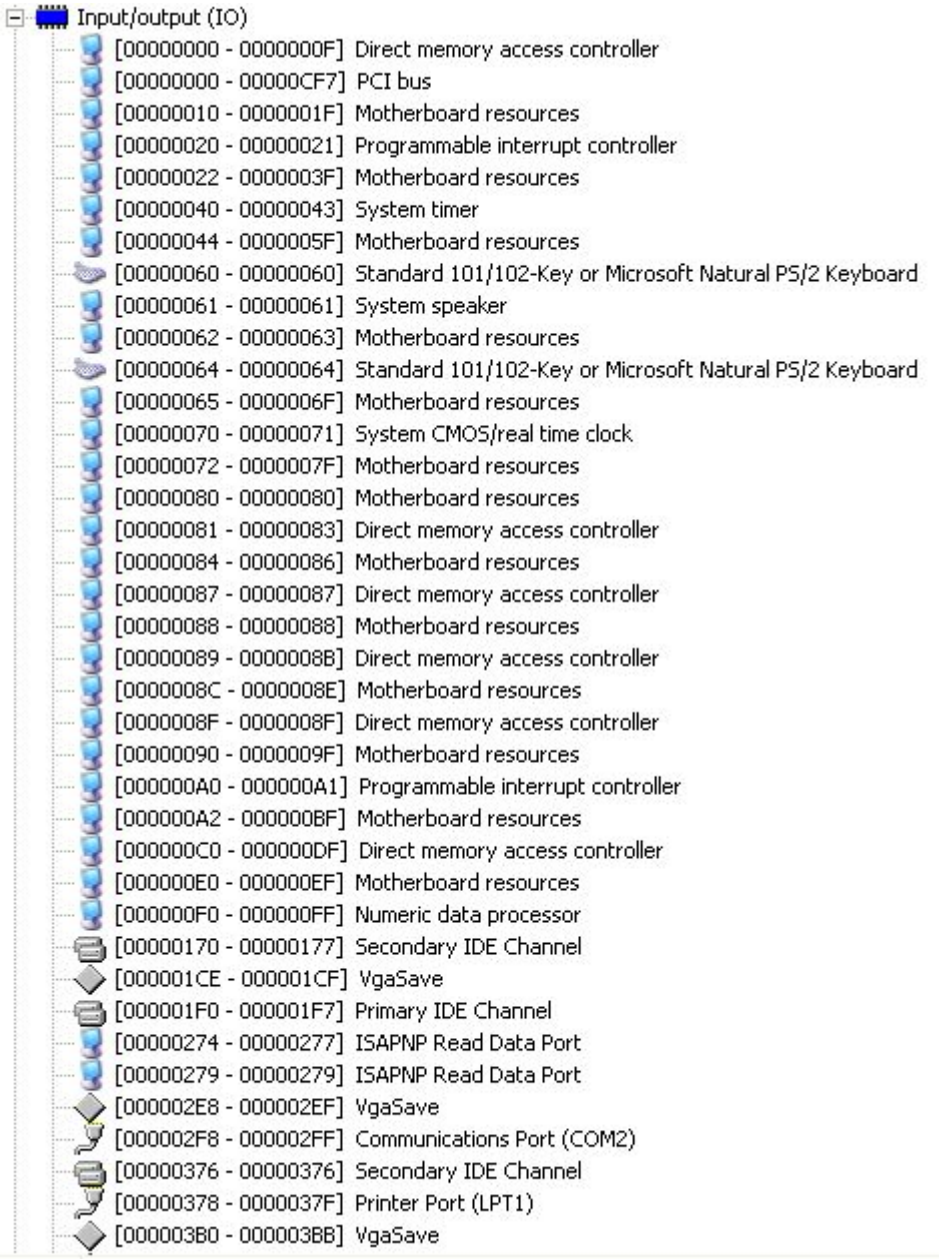
```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT     15H
 ;
; ADD THE APPLICATION PROGRAM HERE
;
        CMP     EXIT_AP, 1      ;is the application over?
        JNE     W_LOOP          ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT     15H
;
; EXIT ;
```

Appendix

E

Address Mapping

E.1 I/O Address Map


Input/output (IO)
[00000000 - 0000000F] Direct memory access controller
[00000000 - 00000CF7] PCI bus
[00000010 - 0000001F] Motherboard resources
[00000020 - 00000021] Programmable interrupt controller
[00000022 - 0000003F] Motherboard resources
[00000040 - 00000043] System timer
[00000044 - 0000005F] Motherboard resources
[00000060 - 00000060] Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000061 - 00000061] System speaker
[00000062 - 00000063] Motherboard resources
[00000064 - 00000064] Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000065 - 0000006F] Motherboard resources
[00000070 - 00000071] System CMOS/real time clock
[00000072 - 0000007F] Motherboard resources
[00000080 - 00000080] Motherboard resources
[00000081 - 00000083] Direct memory access controller
[00000084 - 00000086] Motherboard resources
[00000087 - 00000087] Direct memory access controller
[00000088 - 00000088] Motherboard resources
[00000089 - 0000008B] Direct memory access controller
[0000008C - 0000008E] Motherboard resources
[0000008F - 0000008F] Direct memory access controller
[00000090 - 0000009F] Motherboard resources
[000000A0 - 000000A1] Programmable interrupt controller
[000000A2 - 000000BF] Motherboard resources
[000000C0 - 000000DF] Direct memory access controller
[000000E0 - 000000EF] Motherboard resources
[000000F0 - 000000FF] Numeric data processor
[00000170 - 00000177] Secondary IDE Channel
[000001CE - 000001CF] VgaSave
[000001F0 - 000001F7] Primary IDE Channel
[00000274 - 00000277] ISAPNP Read Data Port
[00000279 - 00000279] ISAPNP Read Data Port
[000002E8 - 000002EF] VgaSave
[000002F8 - 000002FF] Communications Port (COM2)
[00000376 - 00000376] Secondary IDE Channel
[00000378 - 0000037F] Printer Port (LPT1)
[000003B0 - 000003BB] VgaSave

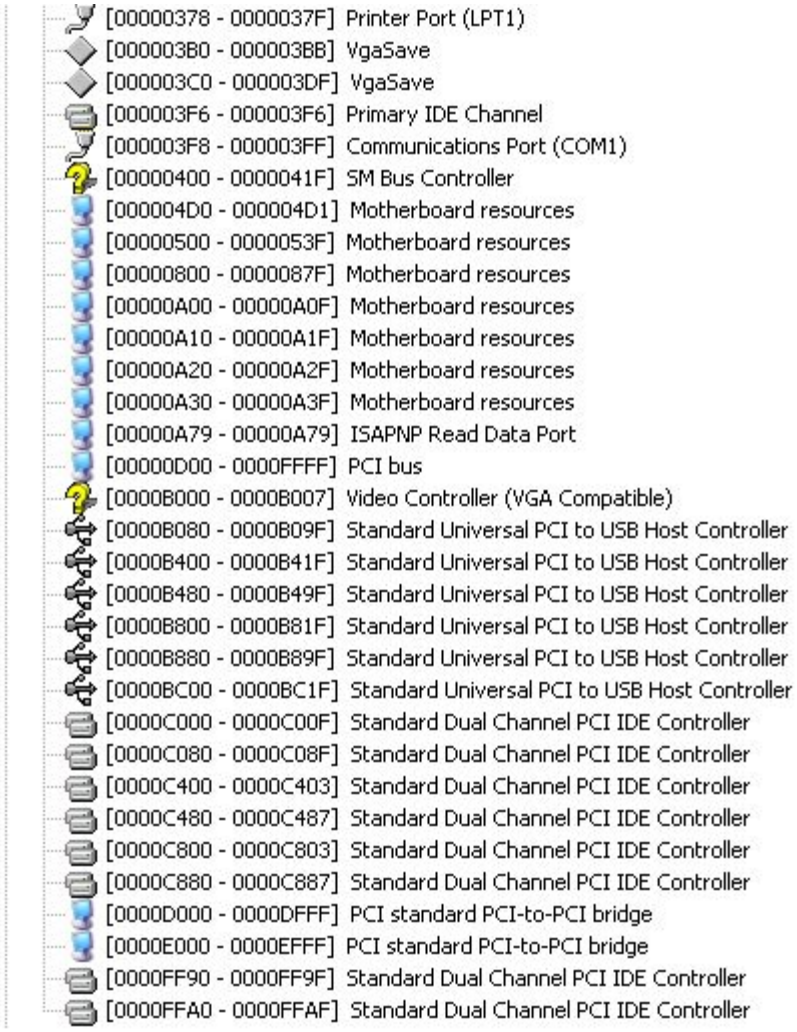

[00000378 - 0000037F] Printer Port (LPT1)
[000003B0 - 000003BB] VgaSave
[000003C0 - 000003DF] VgaSave
[000003F6 - 000003F6] Primary IDE Channel
[000003F8 - 000003FF] Communications Port (COM1)
[00000400 - 0000041F] SM Bus Controller
[000004D0 - 000004D1] Motherboard resources
[00000500 - 0000053F] Motherboard resources
[00000800 - 0000087F] Motherboard resources
[00000A00 - 00000A0F] Motherboard resources
[00000A10 - 00000A1F] Motherboard resources
[00000A20 - 00000A2F] Motherboard resources
[00000A30 - 00000A3F] Motherboard resources
[00000A79 - 00000A79] ISAPNP Read Data Port
[00000D00 - 0000FFFF] PCI bus
[0000B000 - 0000B007] Video Controller (VGA Compatible)
[0000B080 - 0000B09F] Standard Universal PCI to USB Host Controller
[0000B400 - 0000B41F] Standard Universal PCI to USB Host Controller
[0000B480 - 0000B49F] Standard Universal PCI to USB Host Controller
[0000B800 - 0000B81F] Standard Universal PCI to USB Host Controller
[0000B880 - 0000B89F] Standard Universal PCI to USB Host Controller
[0000BC00 - 0000BC1F] Standard Universal PCI to USB Host Controller
[0000C000 - 0000C00F] Standard Dual Channel PCI IDE Controller
[0000C080 - 0000C08F] Standard Dual Channel PCI IDE Controller
[0000C400 - 0000C403] Standard Dual Channel PCI IDE Controller
[0000C480 - 0000C487] Standard Dual Channel PCI IDE Controller
[0000C800 - 0000C803] Standard Dual Channel PCI IDE Controller
[0000C880 - 0000C887] Standard Dual Channel PCI IDE Controller
[0000D000 - 0000DFFF] PCI standard PCI-to-PCI bridge
[0000E000 - 0000EFFF] PCI standard PCI-to-PCI bridge
[0000FF90 - 0000FF9F] Standard Dual Channel PCI IDE Controller
[0000FFA0 - 0000FFAF] Standard Dual Channel PCI IDE Controller

Table E-1: IO Address Map

E.2 IRQ Address Map

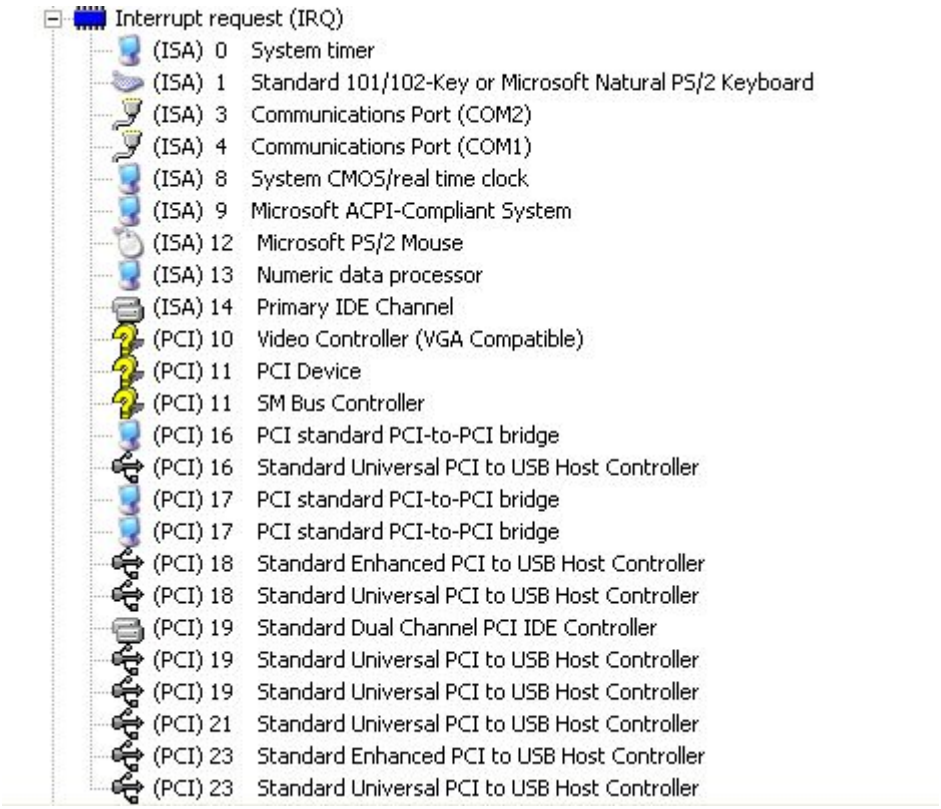
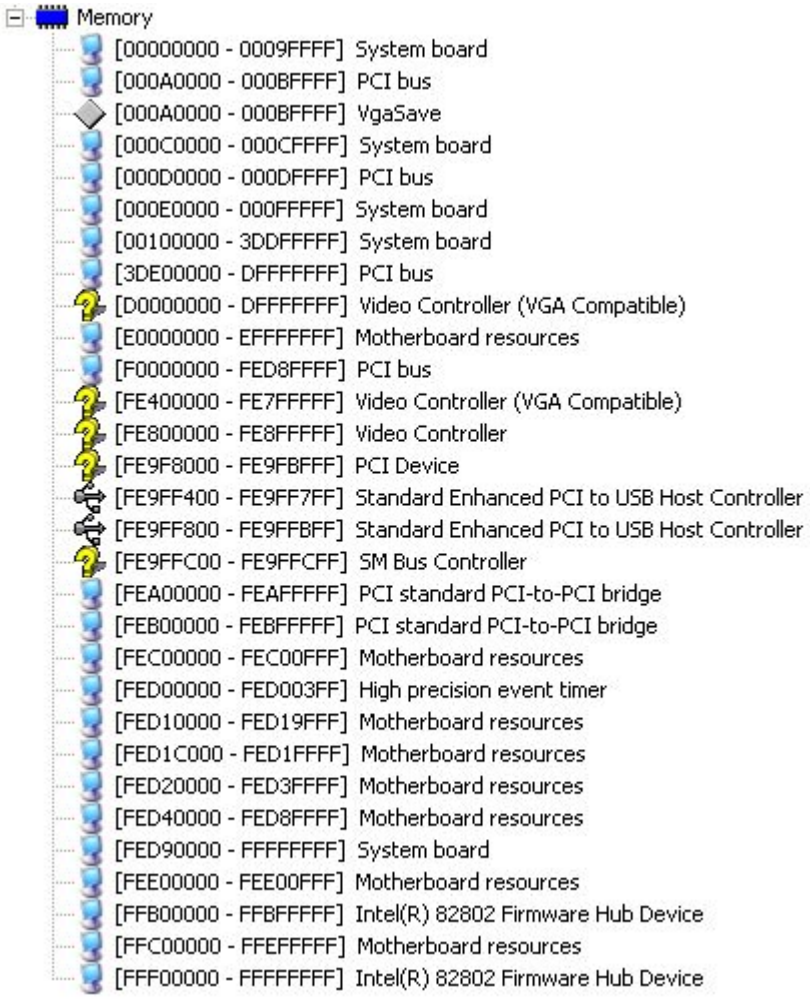

Interrupt request (IRQ)
(ISA) 0 System timer
(ISA) 1 Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
(ISA) 3 Communications Port (COM2)
(ISA) 4 Communications Port (COM1)
(ISA) 8 System CMOS/real time clock
(ISA) 9 Microsoft ACPI-Compliant System
(ISA) 12 Microsoft PS/2 Mouse
(ISA) 13 Numeric data processor
(ISA) 14 Primary IDE Channel
(PCI) 10 Video Controller (VGA Compatible)
(PCI) 11 PCI Device
(PCI) 11 SM Bus Controller
(PCI) 16 PCI standard PCI-to-PCI bridge
(PCI) 16 Standard Universal PCI to USB Host Controller
(PCI) 17 PCI standard PCI-to-PCI bridge
(PCI) 17 PCI standard PCI-to-PCI bridge
(PCI) 18 Standard Enhanced PCI to USB Host Controller
(PCI) 18 Standard Universal PCI to USB Host Controller
(PCI) 19 Standard Dual Channel PCI IDE Controller
(PCI) 19 Standard Universal PCI to USB Host Controller
(PCI) 19 Standard Universal PCI to USB Host Controller
(PCI) 21 Standard Universal PCI to USB Host Controller
(PCI) 23 Standard Enhanced PCI to USB Host Controller
(PCI) 23 Standard Universal PCI to USB Host Controller

Table E-2: IRQ Address Map

E.3 Memory Address Map


Memory
[00000000 - 0009FFFF] System board
[000A0000 - 000BFFFF] PCI bus
[000A0000 - 000BFFFF] VgaSave
[000C0000 - 000CFFFF] System board
[000D0000 - 000DFFFF] PCI bus
[000E0000 - 000FFFFF] System board
[00100000 - 3DDFFFFF] System board
[3DE00000 - DFFFFFFF] PCI bus
[D0000000 - DFFFFFFF] Video Controller (VGA Compatible)
[E0000000 - EFFFFFFF] Motherboard resources
[F0000000 - FED8FFFF] PCI bus
[FE400000 - FE7FFFFF] Video Controller (VGA Compatible)
[FE800000 - FE8FFFFF] Video Controller
[FE9F8000 - FE9FBFFF] PCI Device
[FE9FF400 - FE9FF7FF] Standard Enhanced PCI to USB Host Controller
[FE9FF800 - FE9FFBFF] Standard Enhanced PCI to USB Host Controller
[FE9FFC00 - FE9FFCFF] SM Bus Controller
[FEA00000 - FEAFFFFF] PCI standard PCI-to-PCI bridge
[FEB00000 - FEBFFFFF] PCI standard PCI-to-PCI bridge
[FEC00000 - FEC00FFF] Motherboard resources
[FED00000 - FED003FF] High precision event timer
[FED10000 - FED19FFF] Motherboard resources
[FED1C000 - FED1FFFF] Motherboard resources
[FED20000 - FED3FFFF] Motherboard resources
[FED40000 - FED8FFFF] Motherboard resources
[FED90000 - FFFFFFFF] System board
[FEE00000 - FEE00FFF] Motherboard resources
[FFB00000 - FFBFFFFF] Intel(R) 82802 Firmware Hub Device
[FFC00000 - FFEFFFFF] Motherboard resources
[FFF00000 - FFFFFFFF] Intel(R) 82802 Firmware Hub Device

Appendix

F

Compatibility

NOTE:

The compatible items described here have been tested by the IEI R&D team and found to be compatible with the PICOe-GM45A.

F.1 Compatible Operating Systems

The following operating systems have been successfully run on the PICOe-GM45A.

- Microsoft Windows Vista Business (32-bit)
- Microsoft Windows Vista Business (64-bit)
- Microsoft Windows XP with SP2
- Microsoft Windows 2000 with SP4
- Fedora Core 8
- Mandriva Linux 2008

F.2 Compatible Processors

The following Socket P processors have been successfully tested on the PICOe-GM45A.

CPU	Model Number	Clock Speed	FSB	Architecture
Intel® Core™2 Duo	P9500	2.53 GHz	1066 MHz	45 nm
Intel® Core™2 Duo	P8600	2.4 GHz	1066 MHz	45 nm
Intel® Core™2 Duo	P8400	2.26 GHz	1066 MHz	45 nm
Intel® Celeron® M	575	2.00 GHz	667 MHz	65 nm
Intel® Celeron® M	585	2.16 GHz	667 MHz	65 nm

F.3 Compatible Memory Modules

NOTE:

The memory modules listed below have been tested on the PICOe-GM45A other memory modules that comply with the specifications may also work on the PICOe-GM45A but have not been tested.

The following DDR2 memory modules have been successfully tested on the PICOe-GM45A.

Manufacturer	Chip Model No.	Capacity	Speed
Kingston	HY5PS12821CFP-Y5	512 MB	800 MHz
Kingston	HY5PS12821B	512 MB	667 MHz
Kingston	E5108AJBG-8E-E	1.0 GB	800 MHz
Apacer	AM4B5708GQJS7E	512 MB	667 MHz
DSL	E5108AHSE-8E-E	512 MB	800 MHz
Transcend	K4T51083QE	512 MB	800 MHz
TwinMOS	TMM6208G8M25C	512 MB	800 MHz
UNIGEN	E5108AMBG-8E	512 MB	800 MHz
UMAX	U2S12D30TP-6E	512 MB	667 MHz
PK	BFU770VE11-36EC08Y-800	512 MB	800 MHz
Kingbox	7HD22D9GMH	512 MB	800 MHz
Kingbox	EPD264Q822OOE-4	512 MB	667 MHz

Appendix

G

Hazardous Materials Disclosure

G.1 Hazardous Material Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	x	O	O	O	O	x
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。